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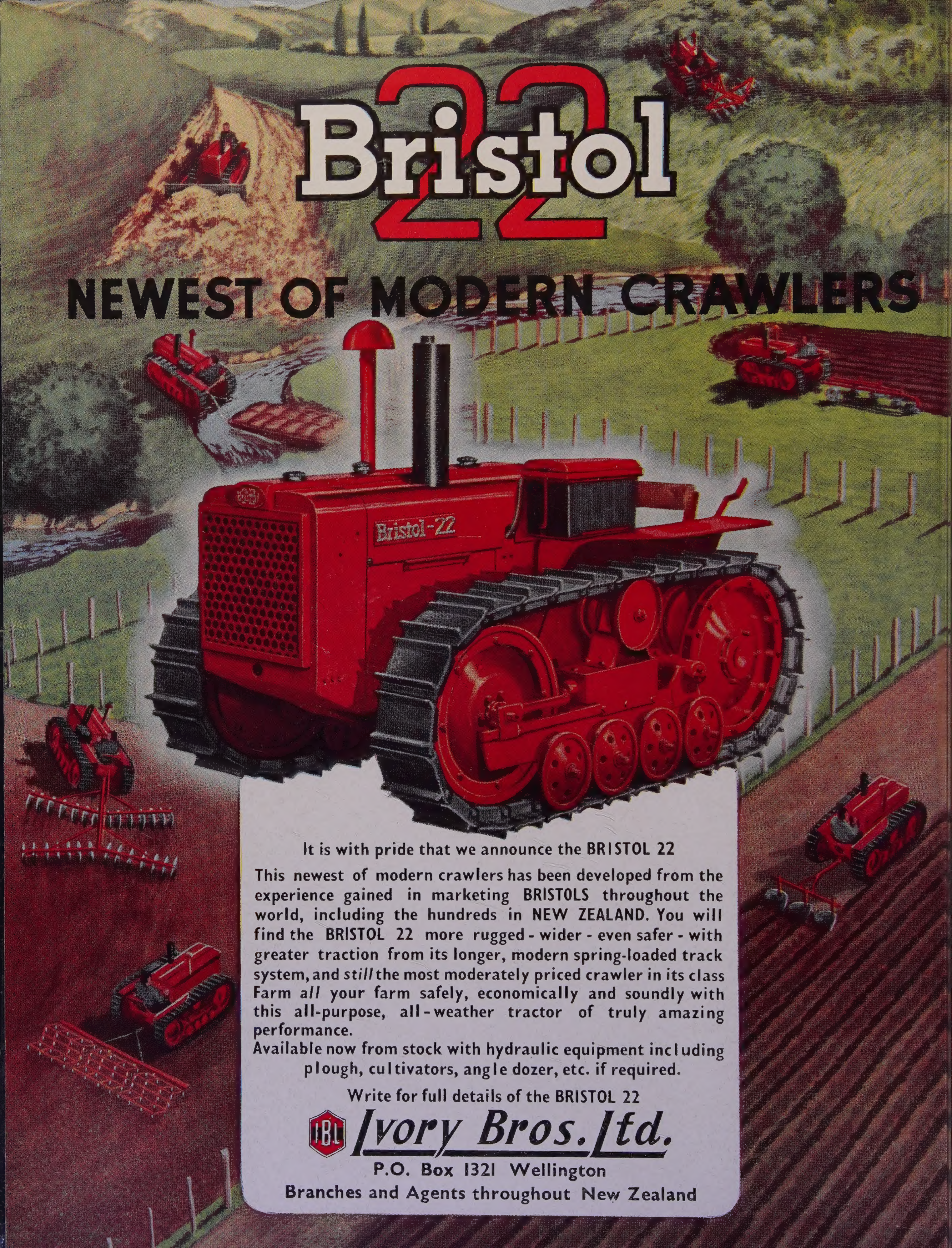

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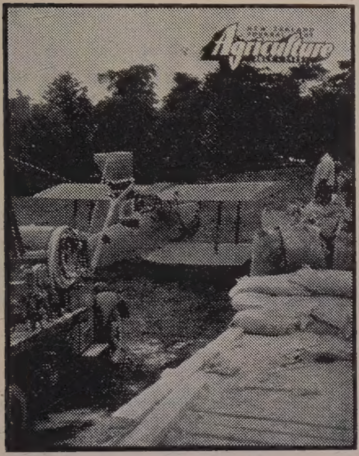
This Month's Cover



Though aerial topdressing has been done fairly extensively only in the last 3 years, it is estimated that in the 12 months up to April 1953 about 1,000,000 acres were treated. Many problems, chief among them that of securing an aircraft designed for the work of topdressing under New Zealand conditions, have yet to be overcome, but aerial topdressing has been enthusiastically accepted by farmers, particularly those on hill country, and capably organised by air work contractors. This month's cover shows a Tiger Moth aeroplane being loaded for aerial distribution of superphosphate at Glencoe Station, Maraekakaho, Hawkes Bay.

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Replacement Stock for the Dairy Industry

IN the past few years dairy production has reached record levels. In 1946-47 total butterfat production was 408 million lb. from 1,658,000 cows. Two years later it had increased to 457 million lb. from 1,747,000 cows and in 1951-52 to 506 million lb. from 1,906,000 cows. Statistics of dairy cow numbers for 1952-53 are not yet available, but a forecast of production indicates that at least 535 million lb. will be reached. Between 1946-47 and 1951-52 production increased by 25 per cent. and cow numbers by only 15 per cent., which is reflected in the average production per cow: 243lb. in 1946-47 and 263lb. in 1951-52. For 1952-53 the average will probably exceed 270lb. per cow.

Favourable Seasons

This is a remarkably high level to attain and it is clear that there has been a considerable improvement in the efficiency of the dairy industry in recent years. I think, however, that it is generally accepted in the industry that at least part of the increase in production in recent years has been due to favourable dairy seasons. The weather has been kind to dairying if not to other branches of farming. A study of the available statistics indicates that a major part of the increase of 30 million lb. of butterfat this season has been due to an increase in production per cow rather than to an increase in the number of cows.

Decline in Heifers Reared

The figures I refer to are those of replacement dairy stock and unfortunately there has been a declining trend in the number of heifer calves reared in the past 3 years. In 1947, 365,000 dairy heifer calves were reared. By 1950 the corresponding figure was 410,000. In 1951 it was 407,000, and in 1952, 381,000.

It appears from a study of dairy heifer numbers in relation to dairy cow numbers that to obtain progressive increases in our dairy herd the number of heifer calves reared should be equal to about 22 per cent. of dairy cow numbers. This was about the average ratio between 1946 and 1950, but in 1951 it had dropped to 21.4 per cent. and in 1952 to 20.0 per cent. Had the 22 per cent. ratio been maintained, the number of dairy heifers reared in 1951 and 1952 would have been about 49,000 greater, which would have meant, allowing for losses, some 40,000 extra heifers coming into production this year and next.

Unused Grass: Expensive Cows

It may be asked whether there is really a demand for the extra cows. One answer, of course, is to look at the quantities of unused grass seen about almost everywhere this season. A more concrete reply is found in the prices being paid for dairy cows. The increase in dairy cow prices has been much greater than the increase in the pay-out for butterfat over the same period.

Virgin land is being developed at the rate of 70,000 to 80,000 acres a year, of which a considerable proportion will no doubt be used for dairying. There is thus a considerable demand for young dairy stock from this source alone in addition to normal replacement and expansion of herds on developed farms.

In 1952 there were in New Zealand 35,654 herds of 10 cows or more. Thus if, on the average, every one of these farmers reared one more heifer calf, the prospective shortage of dairy cows would to a large extent be overcome.

Early Weaning

I am aware that the costs of rearing a dairy heifer from birth to the commencement of the first lactation are considerable.

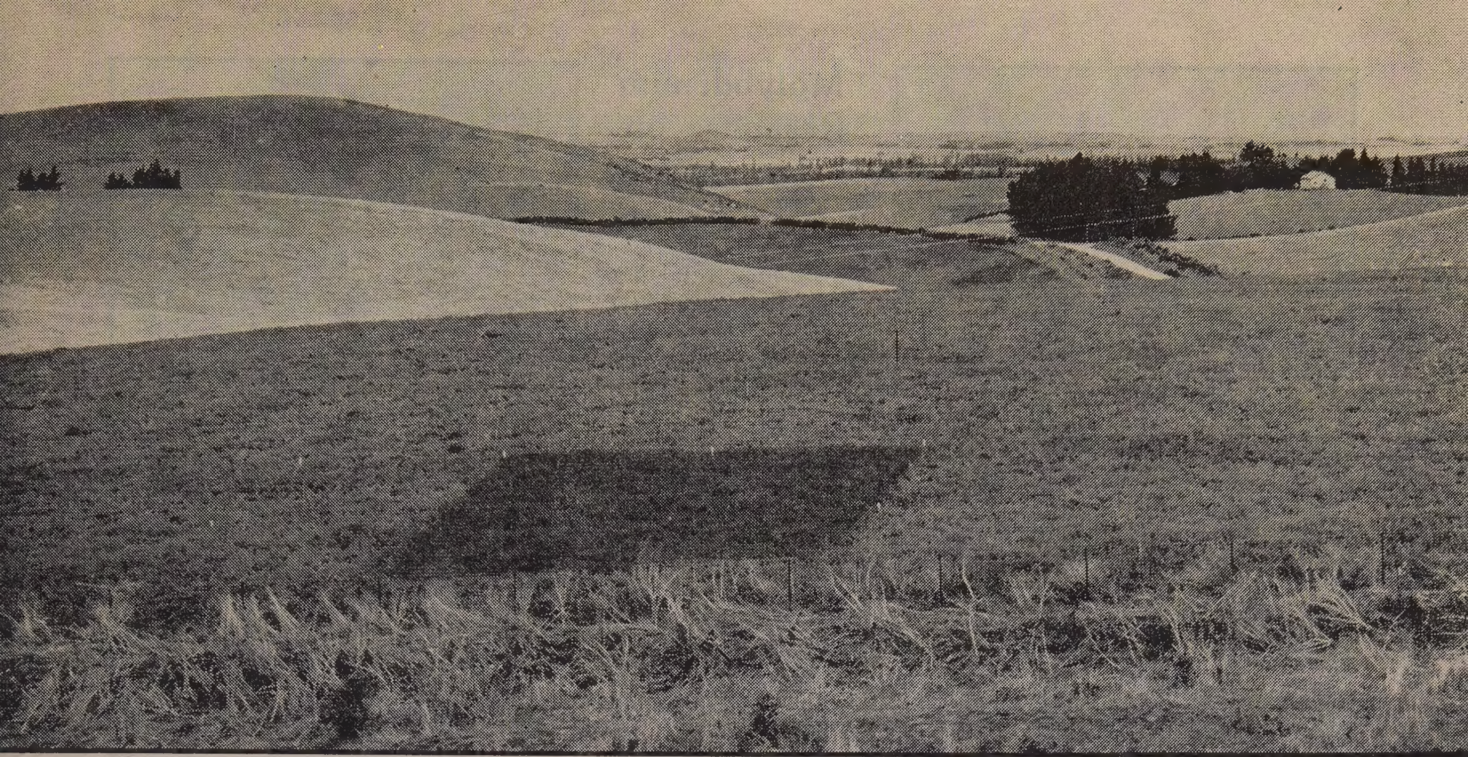
Research at the Department of Agriculture's Ruakura Animal Research Station has indicated, however, that if good pasture is provided, it is possible to wean calves at 8 weeks of age without any harmful effects and with a consequent saving of over 100 gallons of separated milk which could be diverted to pig-meat production. Alternatively the early weaning system makes calf rearing much easier on farms supplying milk for cheese, milk powder, or town supply where the rearing of replacements was formerly regarded as too difficult.

In any case the loss of butterfat through farms being understocked because of a shortage of dairy cows will far outweigh the costs of rearing additional replacement heifers.

Dairying a Major Industry

Dairying is one of New Zealand's major industries. The total value of dairy production of all types in 1951-52 was approximately £90,000,000 and this year it will be about £100,000,000. The potential for increasing production is considerable and it would be a great pity if otherwise attainable increases were delayed by a serious shortage of dairy stock. I would therefore urge all dairy farmers who can possibly do so to make every effort to rear that extra calf or if possible those extra calves. It is an investment which I feel sure will be amply rewarded.

K. J. HOLYOAKE, Minister of Agriculture



HEADING PHOTOGRAPH: Molybdenum trial on lucerne at Tapui. The dark area in the foreground was sprayed with sodium molybdate at the rate of 2½oz. per acre.

Progress of Molybdenum Investigations in North Otago

By W. R. LOBB, Instructor in Agriculture, Department of Agriculture, Oamaru

EARLY work with molybdenum in North Otago was described in an article in the May 1952 "Journal". It appeared from the 14 trials showing responses at that time that this trace element might assume some significance in the economy of North Otago farms. During the past year over 40 trials have confirmed this view. The number of responses now obtained makes it possible to discuss the results in relation to soil types and to give further information on crop responses and rates and time of application.

OF the responses obtained in trials there have been 16 on pasture, 17 on lucerne, 4 on rape, 2 on wheat, and 1 on oats. An additional trial, conducted in a molybdenum-deficient paddock on a garden scale to test the range of plants which might respond, indicated that a large number of crops will respond and that the order of the response varies.

Species Responses

The following list sets out the observations made on the species responses in this trial.

Leguminosae

Responding

Sweet clover Lucerne Trigonella	By far the greatest responses
Montgomery red clover Cowgrass	Very marked responses
White clover Zig-zag clover Subterranean clover	Marked responses

In the main the pasture trials in the area owe their greatest response to the clovers in the sward.

The principal symptom of molybdenum deficiency, and one which is generally most marked, is the poor colour and unthriftiness of plants. Leaves are pale green to yellow, leaf formation is poor, and plants generally are very stunted. The poor colour is very noticeable in lucerne stands and in this crop there is frequently a pale green to yellowish mottling on the leaves not unlike the condition ascribed to lucerne mosaic.

Non-responding

Beans
Lupins
Partridge peas
Tares

Although peas did not show a marked response during their growing period, it was noticeable that at maturity the better crop was on the treated plots and that it matured later than that on the untreated plots. Overseas evidence suggests that peas and other large-seeded legumes have enough molybdenum in the seed for satisfactory growth when grown on molybdenum-deficient land. The pea seed from the untreated plots was retained in an attempt to induce molybdenum deficiencies in the seed and thus to test if this point could be of significance.

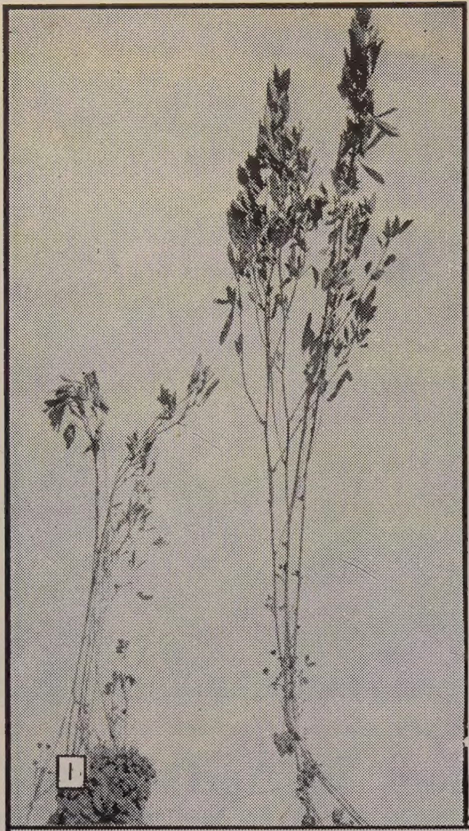
Cruciferae

Responses were obtained in the following:—

Rape
Chou moellier
Turnips
Kale
Swedes
Radish

Rape, chou moellier, kale, and turnips show very marked symptoms which are frequently associated with molybdenum-deficient areas in North Otago. These symptoms are similar to those caused by other deficiencies or excesses; differing types of symptoms occurring in the one crop may be an indication of more than one deficiency in the same area. Drought or excess moisture affects the growth of the crop and may be indirectly responsible for influencing the uptake of both major and minor essential elements.

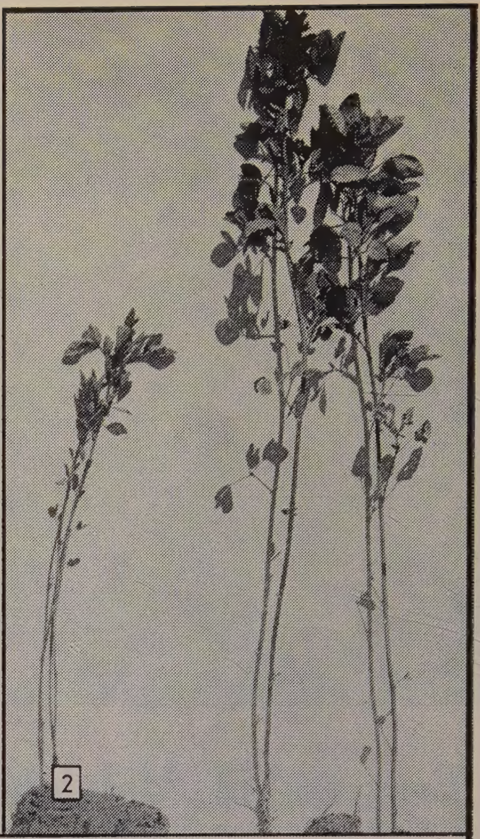
Apart from general stunting in the above crops, there is decided paleness and often a yellowish mottling of the leaves and sometimes a marked yellowing around the leaf margins. The leaves are frequently cup shaped and rolled inward, and this is especially pronounced in young plants. In addition the margins of leaves are irregularly formed and may run into the midribs in several places, but in young plants this malformation occurs most frequently near the bases of the leaves. It resembles the symptom

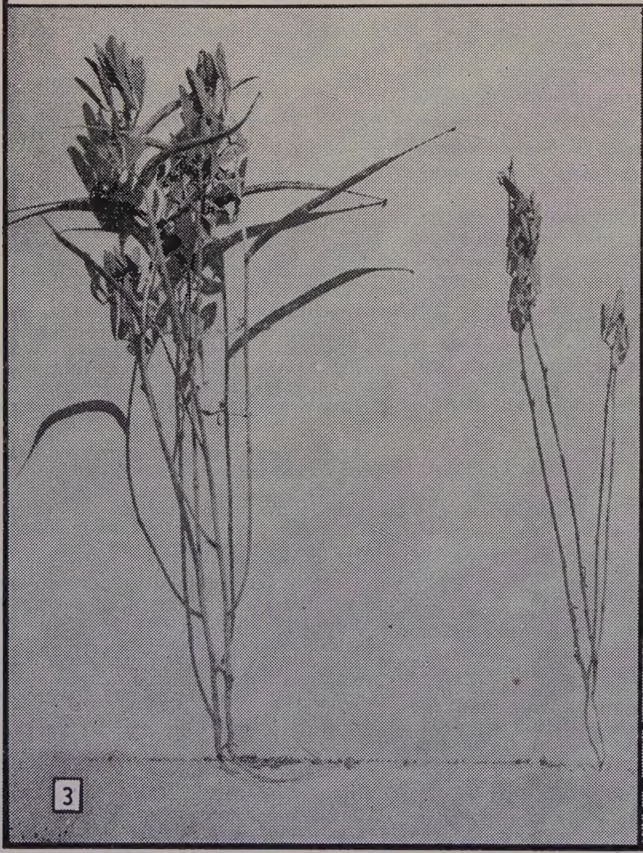


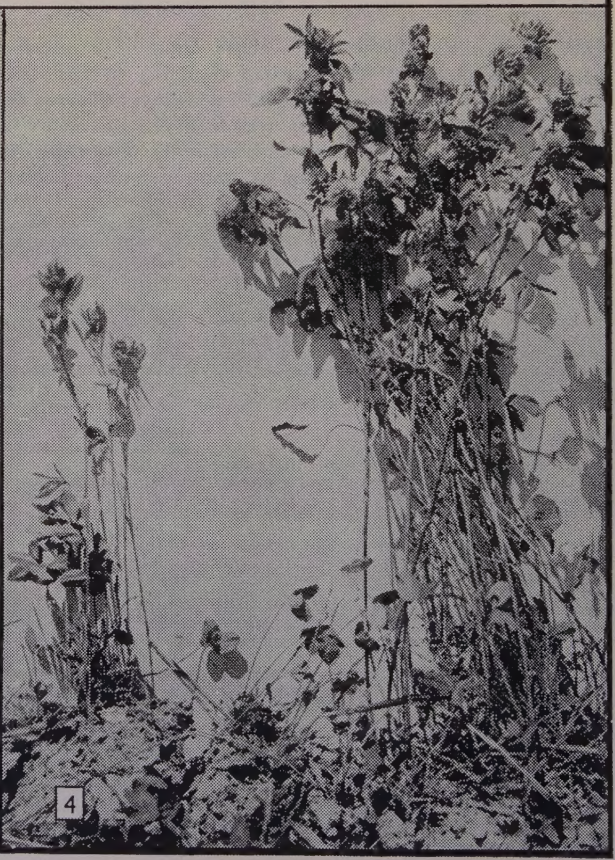
Molybdenum Response on Legumes

The type of response obtained on legumes is shown clearly in these illustrations of plants taken from treated and untreated areas in the molybdenum garden at Herbert. All the plots received superphosphate, but the healthy, vigorous plants were from the plots which were sprayed with molybdenum. 1—Lucerne (untreated left, treated right). 2—Sweet clover (untreated left, treated right). 3—Trigonella (treated left, untreated right). 4—Red clover (untreated left, treated right).

Robertson photos







["Otago Daily Times"

which distinguishes whiptail disease of cauliflower.

Chenopodiaceae

Mangolds, silver beet, and chard responded. The symptoms in chenopodiaceae were not as definite as those in the cruciferae, paleness and stunting being the only definite features.

Umbelliferae

Both carrots and parsnips responded. The difference in growth was very marked; untreated plants were yellow and very stunted.

Graminae

Cereals

Wheat, oats, and ryecorn responded. Barley gave no response.

In cereals a pale yellow in the early growth and stunting of the plants are characteristic. During growth the early difference becomes less marked, but it shows up at the stage the plants come into ear and again at ripening.

Grasses

In this trial the following grasses all grew better and were darker in their early growth:—

Perennial, short-rotation, and Italian ryegrasses

Cocksfoot, crested dogstail

Timothy, *Phalaris tuberosa*

Apart from the responses recorded in these trials, several weed species have been noted to respond. The most marked of these was fat-hen. In

Above and below—Two typical ridges on the clay soils at Herbert. The illustration above shows the state which these ridges too frequently reach within a year or two of sowing. The swards run out, leaving hairgrass, weeds, and bare ground. When these clay soils have been overcropped and badly managed legume establishment and growth become negligible. That clover can be grown can be seen from the illustration below, and in revitalising this country molybdenum is of importance. The healthy, dense red clover shown below is growing on a ridge denuded almost to clay which was treated with molybdenum superphosphate.

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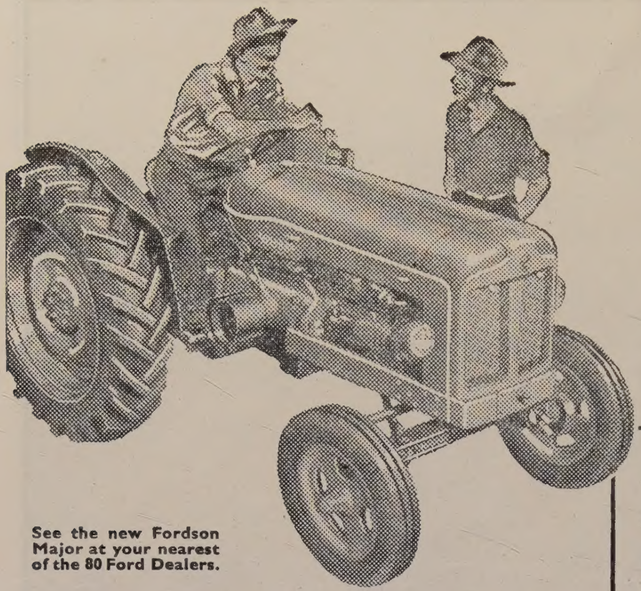

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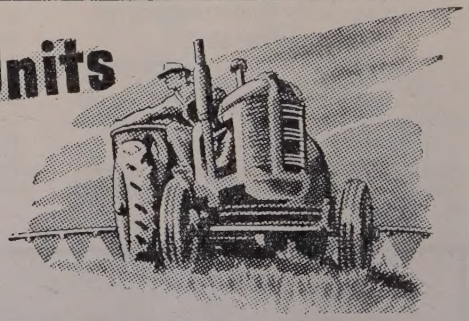

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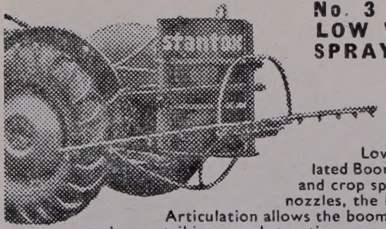

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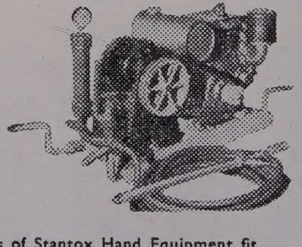

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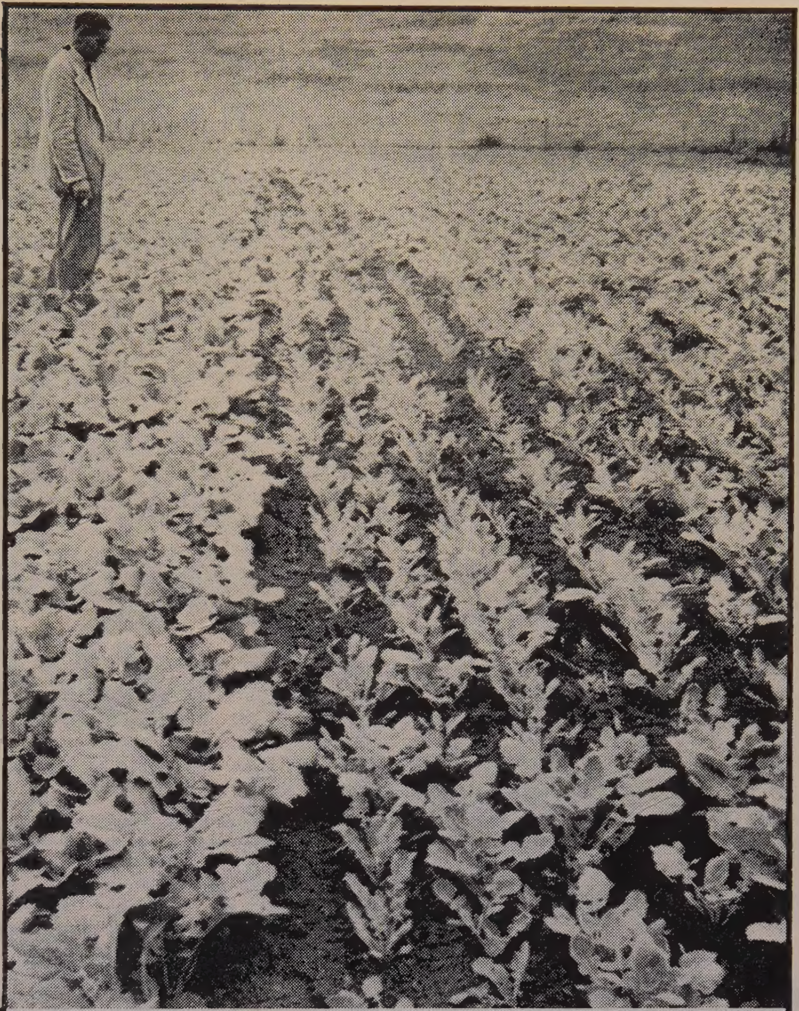
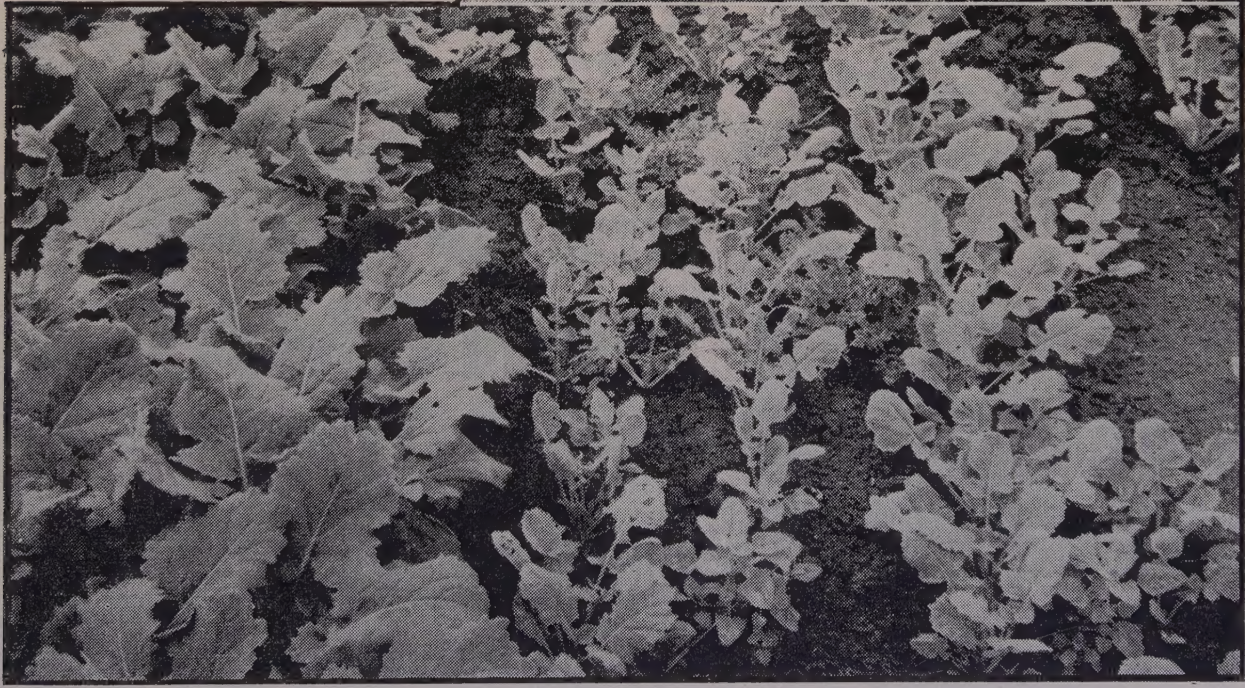
the rape crop illustrated the fat-hen was stunted, very pale green, and mottled yellow in the untreated area, but fully 6in. taller and healthy in the treated area.

Soil Responses

It is possible now to survey the responses in relation to the soil types in the area. There have been 17 responses on Kauru silt loam, 10 on Claremont silt loam, 7 on Opuha silt loam, 4 on Timaru silt loam, 1 on Oamaru complex, and 1 on Lismore stony loam. In addition to this it is

Right—This remarkable result was obtained on a rape crop at Burnside, North Otago, on Kauru silt loam. The portion of the crop on the left was sown with reverted superphosphate to which 3oz. of sodium molybdate per acre was added. The strip on the right was sown with reverted superphosphate. The portion of the crop in the extreme right background was sprayed with 2oz. of sodium molybdate per acre. Measurements before the crop was fed indicated that there was an increase of 600 per cent. in green material from the use of molybdenum. Below—Close-up of the crop shows the type of symptoms which might be attributed to acute molybdenum deficiency. Plants on untreated strip (right) are stunted, much paler than plants on treated strip (left), and tend to be yellow and mottled. They are sickly and tend to be damaged by insects. The leaves are poorly formed and many are cup shaped and rolled inward around the margins. Their stems stand out and there is poor leaf formation around the bases of the stems.





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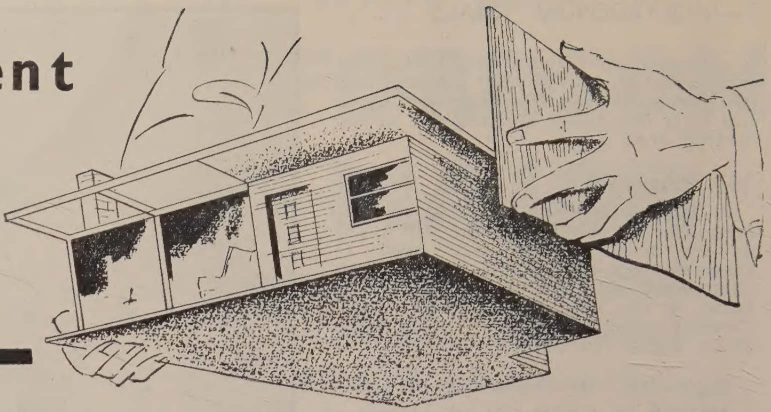

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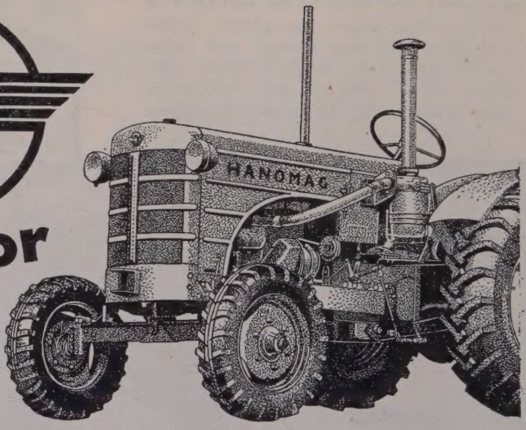

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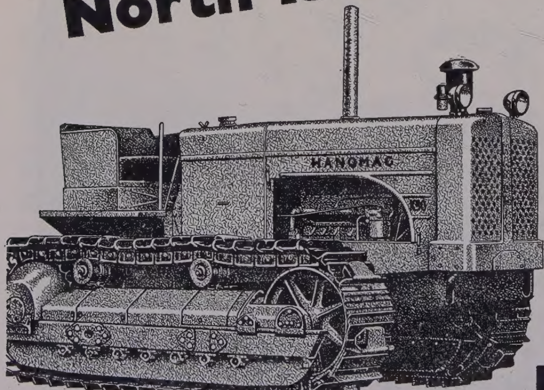

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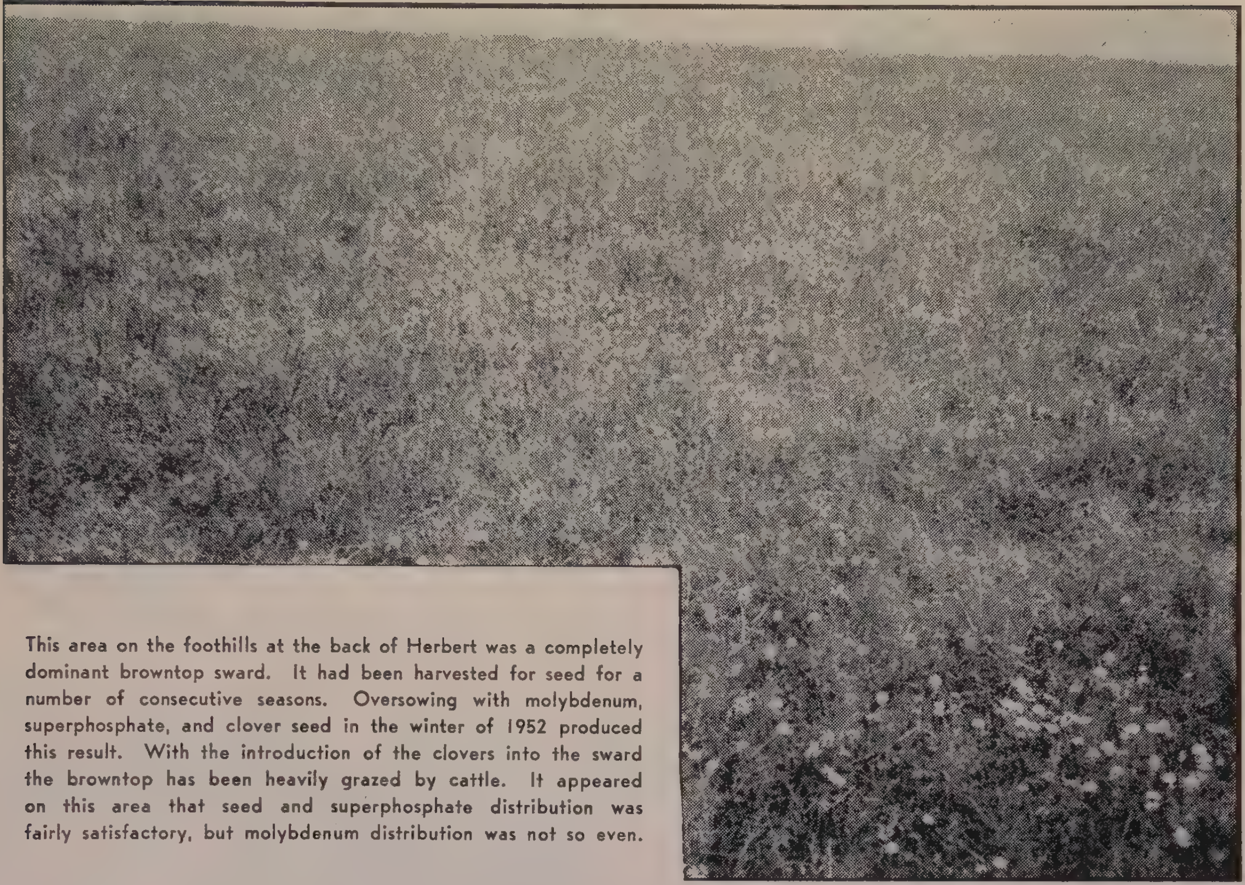


This area on the foothills at the back of Herbert was a completely dominant browntop sward. It had been harvested for seed for a number of consecutive seasons. Oversowing with molybdenum, superphosphate, and clover seed in the winter of 1952 produced this result. With the introduction of the clovers into the sward the browntop has been heavily grazed by cattle. It appeared on this area that seed and superphosphate distribution was fairly satisfactory, but molybdenum distribution was not so even.

known that cauliflowers respond to molybdenum treatment on the Waiareka complex or the "tarry" soils. Some evidence suggests that manganese excess and molybdenum deficiency may occur together, and this is thought to be possible on the tarry soils and perhaps others in North Otago.

Three of the soil types mentioned, Opuha, Claremont, and Timaru silt loams, are not greatly dissimilar. Half the responses in the district are on these soil types and of these soils Opuha is the poorest, Claremont intermediate, and Timaru the best. In North Otago molybdenum deficiency occurs most frequently on Opuha silt loam and on Timaru silt loam only where a system of farming that has depleted the soil has been practised. Usually the pH of these soils is relatively low, the phosphate low, and potash very high. Generally they are low in molybdenum (less than 0.1 parts per million of available molybdenum). Responses on these soils have been spectacular with red clover and lucerne and very pronounced with white clover. The garden referred to earlier is on Opuha silt loam.

Throughout the experimental work on this area it has been noted that where these soils have been well treated with phosphates and lime, particularly lime, and where they have not been cropped heavily they can produce and maintain reasonable pastures. The most spectacular molybdenum responses occur where heavy cropping has been practised, but there have been marked responses on areas that have been eroded to the subsoil, and it is astonishing to see vigorous, healthy red clover growing on pure clay spurs after the addition of molybdenum, whereas without it red clover is sickly and dying. These soils respond markedly to heavy dressings of lime, but responses to lime are not as rapid or as great as those to molybdenum. Many of the responses have been obtained without the use of phosphates or lime. The maintenance of production will probably depend on the ultimate use of phosphates and lime, as the soils have a lime requirement of about 15cwt. per acre and are low in phosphates.

Kauru Silt Loam

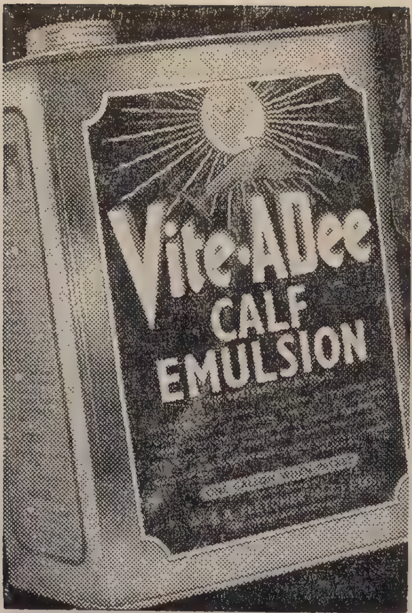
The soil type on which the response to molybdenum is most interesting is Kauru silt loam, a poor, slowly weathering sandstone soil which is very widely distributed in North Otago. Of the 17 responses obtained on it, 8 have been on lucerne, 4 on pasture, 2 on rape, 2 on wheat, and 1 on oats. The possibility of further trace-element deficiencies in this soil cannot be dismissed. Responses to boron have been recorded and there are suspected deficiencies of copper, magnesium, and possibly zinc.

Soil tests on this type show no fixed pattern; the pH varies from 5.3 to 6.8 and phosphate is in some areas very high and in others low. The figure for available molybdenum varies from about 0.05 to 0.18 parts per million. At the latter figure a clover response would be expected only under highly acid conditions. The greater responses are on areas heavily cropped and not well treated, but marked responses have also been obtained after good treatment. For instance a response on lucerne followed the application of 7 tons of lime in 5 years and annual applications of phosphate. Kauru silt loam is a most variable soil type in behaviour and in formation; it varies not only from paddock to paddock but from patch to patch over every paddock.

Two other responses obtained were on quite different soils, one on Oamaru silt loam and the other on Lismore stony loam. Until more responses on these types occur it is not possible to discuss their probable occurrence. It it significant that both were with lucerne, and this crop appears to be the one most likely to give responses over a wide range of soils. Sweet clover would probably be an even better indicator plant.

Rate of Application

Rate of application was discussed in the first article (the "Journal", May 1952) on molybdenum investigations in North Otago. Further work appears to be necessary before any definite recommendation can be given. On the



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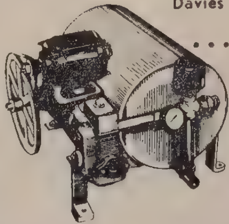

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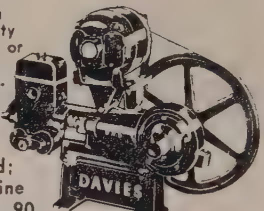

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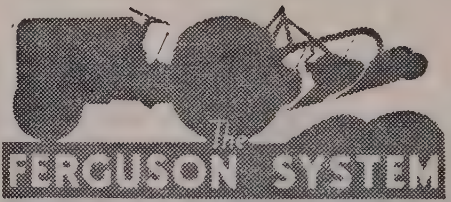

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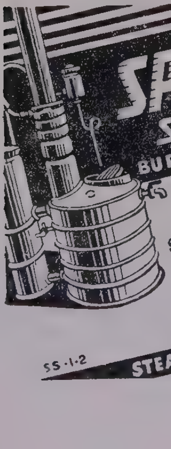

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["*Otago Daily Times*"

On the poor clay ridges at Herbert much land has suffered through mismanagement. Deficiencies in trace elements have in some instances become extremely marked. The illustration shows the type of response which occurs on some of these areas. Vigorous, healthy red clover is growing on the portion at left, which was treated with molybdenum superphosphate (1½cwt. of superphosphate and about 1oz. of molybdenum per acre). The strip at right, which was treated with 1½cwt. of D.D.T. superphosphate per acre, contains grass weeds and poor, sickly clover.

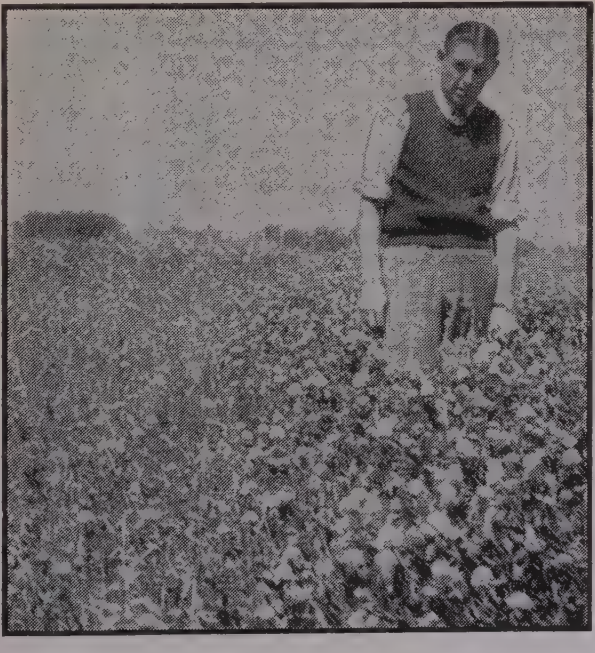
Opuha and Claremont silt loams and possibly on Timaru silt loam 2½oz. of sodium molybdate per acre as recommended in the first article may be sufficient, though lower rates give responses. An ⅛oz. gave a good response on Opuha silt loam, but this low rate seemed slower in achieving its maximum effect than was 2½oz.

Methods of Application

Many methods of applying molybdenum have been used and have given good results. It has been mixed with fertiliser topdressed, sprayed before sowing, sprayed after sowing and before emergence, sprayed after emergence, and applied as a seed dust to pasture mixtures. Used as a dust on rape and turnips it tends to separate from the seed and block the drill and this method is not recommended for these crops. Spraying and dusting allow of fairly exact adjustment of quantities used. On existing pastures where spectacular responses are being obtained without the use of phosphates or lime, spraying is certainly the most practical method of application.

Time of Application

To determine whether molybdenum could be applied with late-autumn and winter dressings of phosphates it was necessary to put down trials month by month. The highly responsive area on Opuha silt loam was selected for this investigation, and other trials laid down during autumn and winter were also kept under observation. Plots containing molybdenum only and molybdenum superphosphate and molybdenum superphosphate and lime were used in this trial. The significant fact emerging from it was that no matter when the molybdenum was applied the area responded.



["*Otago Daily Times*"

Marked response to molybdenum superphosphate and lime at Herbert. Clover more than knee deep (right); unthrifty clover and weeds on untreated portion (left).

On pastures on the proven deficient area in North Otago the earlier the treatment is given in the life of a pasture the better the response will be. The valuable constituents of the pasture should not be allowed to deteriorate before treatment; therefore molybdenum should be applied when pastures are being laid down, and there is no better method than dusting the seeds mixture with the required amount.

Trial Results

The trials reported in the previous article have not been re-treated and the order of results remains the same. The tendency is for the untreated areas to become relatively poorer, whereas molybdenum plots remain high producing, vigorous, and healthy.

The production in the trial at McMann's, Herbert, can be summarised to date as follows:—

	lb. green pasture per acre cut		
Plot	8/1/52	27/3/52	17/1/53
Control	3,300	2,000	3,600
Molybdenum ..	5,200	9,400	17,400
Lime	4,300	3,900	15,200
Lime + molybdenum	7,900	5,800	15,500

The trial at Polson's, Airedale, on Timaru silt loam treated with molybdenum only and receiving no re-treatment can be summarised to date as follows:—

	lb. green pasture per acre cut	
Plot 1	19/1/52	1952-53
Control	4,900	13,700
Molybdenum ..	7,000	20,500
Plot 2		
Control	2,100	12,200
Molybdenum ..	2,900	18,800

The magnitude of these responses indicates the significance of molybdenum in revitalising some of North Otago's problem soils.

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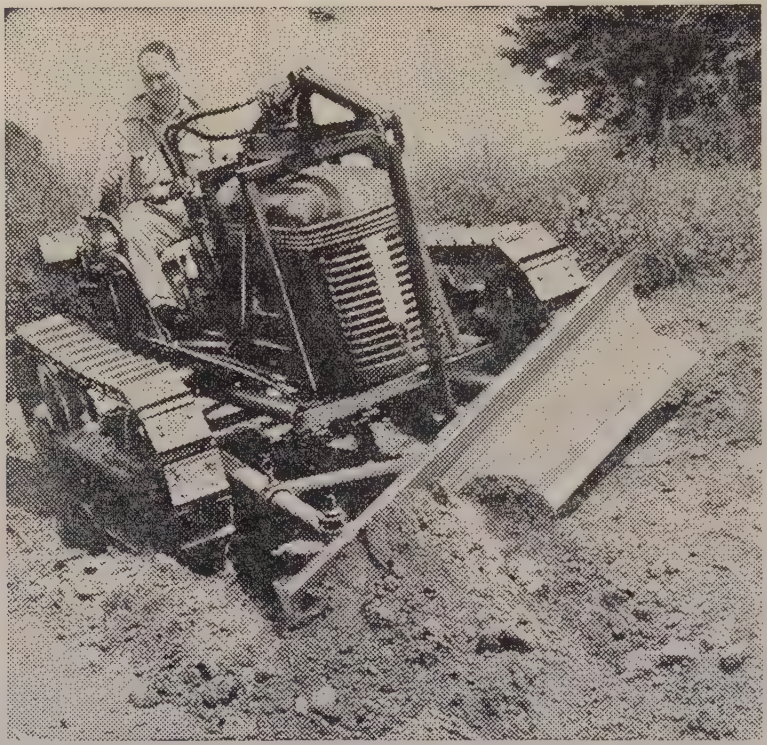

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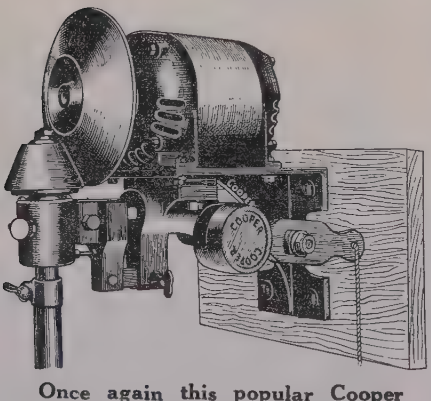

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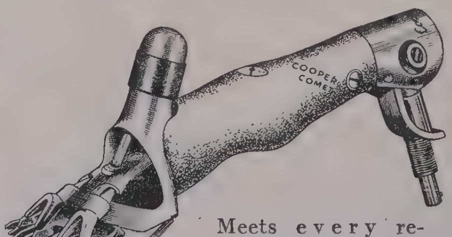

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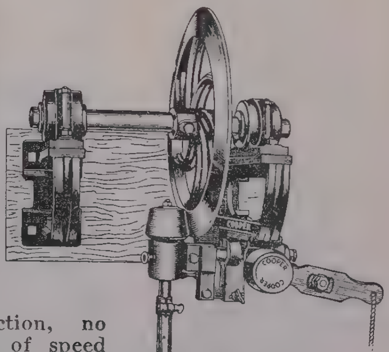

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Neglected Apiaries

By R. GODDARD, Apiary Instructor,
Department of Agriculture, Tauranga

BEEKEEPERS who take a pride in their equipment and the general appearance of their apiaries are naturally perturbed when a neighbouring apiary, whether containing 1 hive or 50 hives, is allowed to deteriorate to such an extent that bee stocks dwindle, die out, or swarm away, leaving hives weak, unprotected, and a potential source of disease. Some people start keeping bees with a burst of enthusiasm, but the handicaps associated with this industry often prove too formidable, resulting in the bees being left to fend for themselves and the apiary becoming neglected.

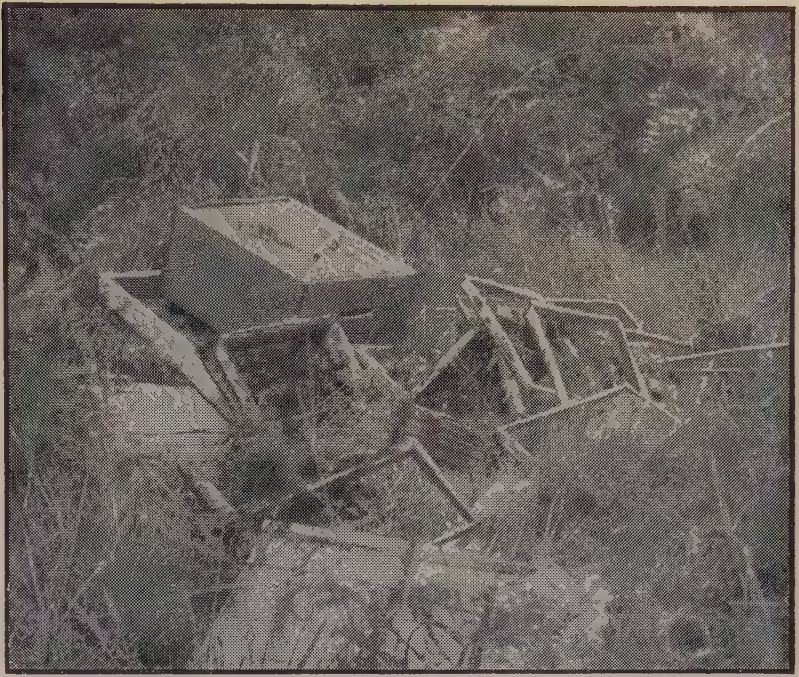
AS with all homes, the hive which houses bees varies with the tidiness of the owner. Although the equipment in an apiary may be in poor condition, it does not necessarily follow that the apiary is neglected, as the bees may be getting regular attention. A neglected apiary is one in which the owner has not attended to the bees and their requirements at critical periods during the breeding season and where the condition of the bees, combs, and equipment has deteriorated to such an extent that the apiary is not in working order and therefore constitutes a menace to the beekeeping industry.

Most beekeepers take great care when selecting sites for their apiaries, as the location of hives has an important bearing on the resultant crop of honey. Good sites therefore are an asset well worth protecting and keeping in order. Yet, after taking considerable trouble in selecting a site some beekeepers fail to keep weed growth in check. If grass and weeds, such as blackberry, gorse, and fern, are uncontrolled, the apiary soon has a neglected appearance, as the illustrations show.

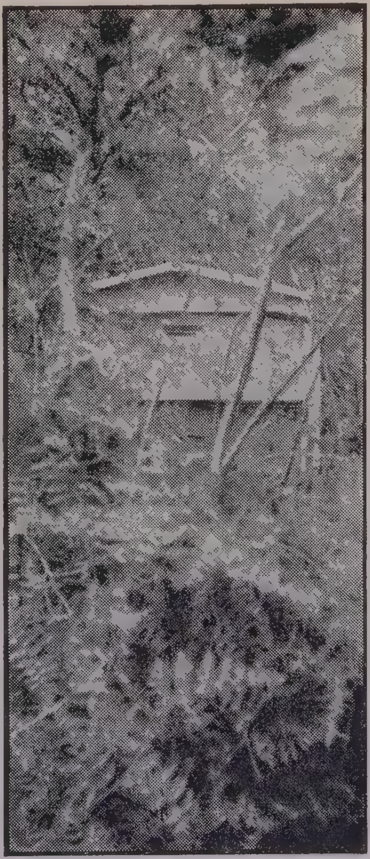
Untidiness Increases Work

In a well-planned apiary the heavy work involved is cut down to a minimum, but it is increased in an untidy yard. Boxes and frames strewn over the yard not only hamper the beekeeper considerably in his work, but when covered with long grass they constitute a danger, as a fall over these hidden obstacles could result in serious injury.

Apiaries where hives are surrounded or covered with weeds cannot be worked properly and are therefore considered to be neglected. Hives left in this state are soon subjected to extreme dampness in wet weather. Mould growth attacks the combs and the bees soon object to being housed under these conditions. Survival is precarious, particularly in winter, but even if the bees manage to keep alive, it is usually in a much weakened state. Hive boxes, lids, and bottom boards will not stand up to continued dampness, and if left in such circumstances, they rot very quickly. Even if weed growth is not extensive, it is most important to keep all hive entrances clear, as heavily laden bees easily become entangled in long grass and have difficulty in getting free. Obstructions also tend to wear away the bees' wings, causing a big loss in the field strength of a hive.



Above—Combs in tipped-over hives destroyed by larvae of the larger wax moth. Below—Hive surrounded with high gorse, fern, and blackberry, which practically prevent approach of bees.



Commercial Apiaries

Unfortunately there are a number of large neglected apiaries in each district and each is a menace to beekeeping in New Zealand. Why do beekeepers neglect their property? Perhaps the apiary was established miles away from the beekeeper's headquarters with the object of securing feed honey for other hives or for testing a new site. Possibly it finally proved uneconomic to manage this apiary or the site was not as good as expected. Whatever the reason, neglected apiaries do exist with bees and equipment left unattended.

The initial cost of establishing an apiary is high. Frames, boxes, bottom boards, lids, paint, nails, wire, and foundation wax have all increased in price and replacement costs will no doubt be considerably higher. Surely this expenditure warrants equipment being given regular attention. Hives not looked after soon lose their saleable value and bee combs rapidly become worthless. Bee stocks dwindle in unattended hives and wax moth and field mice wreak havoc with bee combs.

Domestic Apiaries

In attempts to obtain honey and to overcome the sugar shortage of the war many people in New Zealand without any previous experience or knowledge of apiary management bought hives of bees. Initial enthusiasm with bees usually ends when the inexperienced operator receives his first stinging; consequently, officers of the Department of Agriculture are finding numerous hives that have not been attended to for years.

Many domestic apiaries in New Zealand are neglected in some way by the owners. Equipment which may have been first class years ago has rotted through lack of attention, hives are rarely opened by the owners, crossed combs are numerous, and weed growth extensive.

The Department urges beekeepers who no longer require these hives and who are not prepared to give them the necessary attention to dispose of them to a qualified beekeeper or to have them destroyed.

Danger of Wax Moth

In the North Island, where the climate is comparatively mild, careless beekeeping methods would attract the larger wax moth (*Galleria mellonella*), the larvae of which may cause a great deal of damage to stored or unoccupied bee combs. The larvae seldom attack clean combs, but because of their varied diet requirements they thrive particularly well on old combs containing pollen. The larvae, in search of food, tunnel along the midribs, leaving a mass of webbing and damaged combs which are not fit for further use. These pests breed prolifically and neglected apiaries with dead hives, overturned supers, and general untidiness provide an ideal breeding ground for them. It is not generally known that wax moth is a disease within the meaning of the Apiaries Act 1927 and that beekeepers must rid their apiaries of this pest.

Hive overgrown with fern, gorse, and blackberry. Hives overgrown with noxious weeds are weakened considerably, swarm away, or die out.

American Foul-brood

The greatest danger in an unattended apiary is the possibility of an outbreak of American foul-brood disease. For years the fight against the spread of this disease of bees has been carried out in New Zealand with a great deal of success, but this work would receive a serious setback if an outbreak occurred in a neglected apiary. As hives contracted the disease they would gradually become weaker and be robbed out by stronger colonies, which in turn would be infected. In this manner neighbouring apiaries would become diseased and swarms from every infected apiary would also help to carry the disease to all parts of the district.

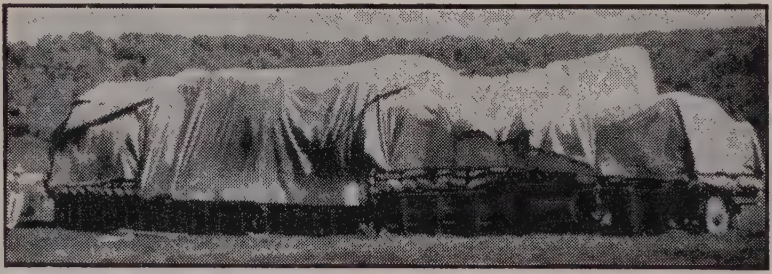
One diseased apiary left unattended could cause a most serious outbreak in an area, and unless drastic action was taken in the initial stages by all beekeepers concerned, the disease could cause a very severe loss in bees, equipment, and potential crops of honey. A blow such as this might force a newly established beekeeper out of business.

Fire Danger

When an apiary is overgrown with grass, fern, blackberry, and gorse as shown in the illustrations, the fire danger is extremely great. During summer the undergrowth reaches a tinder-dry state and if a fire started and spread to other parts of the district, an owner might find himself in serious trouble. The rapidity with which fire spreads is well known, and thousands of pounds of damage could result from an outbreak, particularly in afforestation areas and in country which dries out quickly.

The Department is fully aware of the dangers of neglected apiaries and all Apiary Instructors are keeping a careful watch on any which come to their notice, but the beekeepers concerned should co-operate by bringing their apiaries up to working order or by removing the hives. Before any removal or sale is contemplated, however, a permit must be obtained by the owner of the bees from the local Apiary Instructor. The section of the Act dealing with the sale and moving of bees to a new location is enforced to prevent the possible spread of bee diseases.

Aerial Topdressing Fertiliser Dump



MORE and more farmers are making use of aerial topdressing, and the problem of holding large quantities of fertiliser, generally for only very short periods, has given farmers food for serious thought. A practical solution has been evolved by Mr. Lachlan Maclean, Glencoe Station, Maraekakaho, Hastings.

The accompanying illustration shows an inexpensive and easily made fertiliser dump containing 150 tons of serpentine superphosphate in 1cwt. paper bags alongside the airstrip on his farm. (See cover of this issue.)

The materials used in the construction of this dump are empty tar drums, 6in. x 2in. tanalised *Pinus radiata* timber, fencing wire, and tarpaulins.

Each tar drum is capable of supporting the weight of 1 ton of fertiliser, so that 150 drums were used for this 150-ton dump. The drums are placed base down and timber is laid along their tops a few inches apart. This makes an excellent platform for the bottom layer of bags.

Important features of the dump are (1) its mobility in that it can be easily moved to any part of the farm, and (2) it obviates the necessity of double handling, as the fertiliser can be taken direct from the railhead to the airstrip.

When the dump is not open for use two strands of number 8 fencing wire are tied around it to hold it together so that stock cannot interfere with it. Timber is laid on top and covered with a few sheets of corrugated iron.

To obtain maximum life from the tarpaulins used to cover the dump and to rid them of fertiliser impregnation they are hung on fencing wire stretched between two trees and left to clean in the weather for about a week before storage.

—F. H. COLLIN, Fields Instructor, Department of Agriculture, Hastings

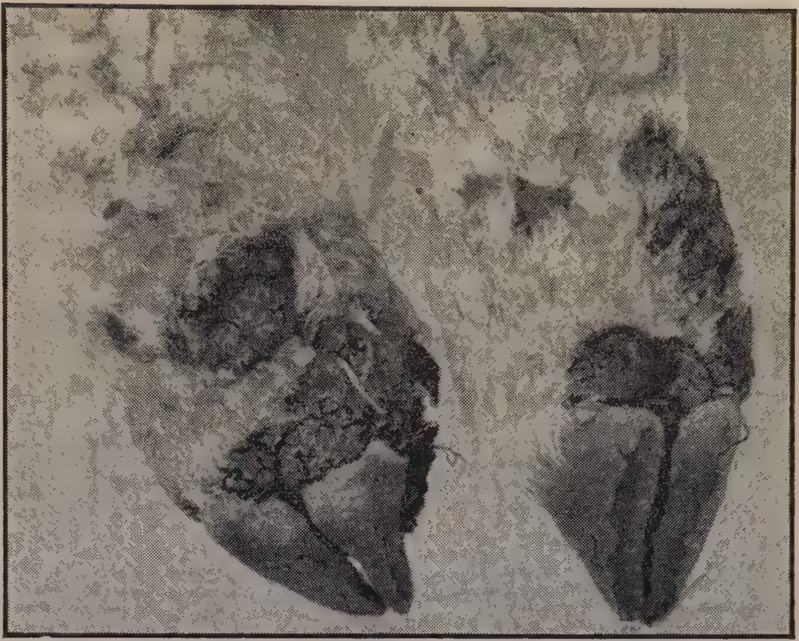
Potash Dressing on Horotiu Sandy Loam

In the notes about recent research work on potash responses on Horotiu sandy loam, which appeared on page 477 of the May issue of the "Journal", an annual maintenance dressing of muriate of potash was given at the end of the second paragraph as about 1½cwt. This should have read about ½cwt.

Symptoms of Contagious Ecthyma in Sheep

By R. M. SALISBURY, Chief Diagnostic Officer, Department of Agriculture Animal Research Station, Wallaceville

THE disease contagious ecthyma is perhaps better known as "scabby mouth", but as the scabs are by no means confined to the mouth, the term may be misleading. Recently some outbreaks of contagious ecthyma have been reported in which the main features have been scabs on the feet. The symptoms of the disease are described in this article to enable sheep farmers to recognise it in its various forms.



Feet of a lamb, showing contagious ecthyma scabs around the coronets and extending up the legs.

CONTAGIOUS ecthyma is a virus disease which is confined to sheep and goats, though odd cases have been recorded in men, mainly sheep farmers, shepherds, etc., who have developed pustular lesions on the hands as a result of handling infected sheep.

The disease is most commonly seen in lambs, though older sheep are equally susceptible. Lambs are principally affected because older animals are usually immune, either as a result of vaccination as lambs or because they have acquired a natural infection at an early age.

The main features of the disease are the development of little pustules on the lips which eventually coalesce into a thick, hard scab which prevents the affected animals from suckling properly, the result being that the lamb loses condition rapidly.

A similar type of scab may develop just above the feet and may extend as high as the knees and hocks. This year there have been a number of outbreaks where the scabs were mainly confined to the legs, with a small percentage of cases showing scabs on the mouth also. A few sheep which were kept under observation made a good recovery without treatment in about 14 days, but another when first examined was badly fly blown around the feet. Cracking of the skin at the coronet had produced an ideal spot for the fly to strike.

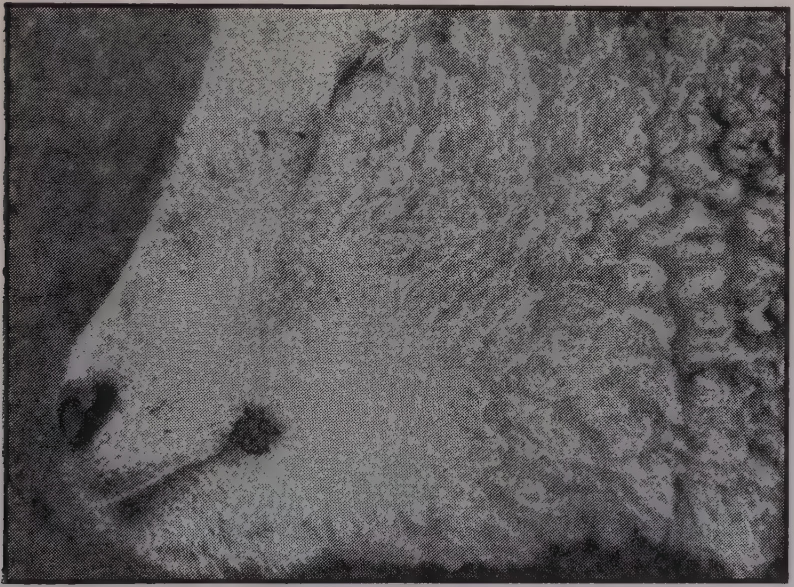
Where lambs are affected and the ewes on which they are running are susceptible the disease will be transferred to the udder of the ewe. Some very serious complications have arisen as a result of udder infection, because gangrenous mastitis is a common sequel.

Contagious ecthyma may therefore be manifested in many ways, but it is usual to expect a percentage of cases with the scabs on the mouth. Rams have been seen where the infection has extended to the scrotum. These features are pointed out so that the disease may be recognised whether it is found on the lips, legs, scrotum, udder, or on any other portion of the body. It is usually confined to the unwoolled parts and those most susceptible to injury from thistles, etc., through which the virus is allowed to enter.

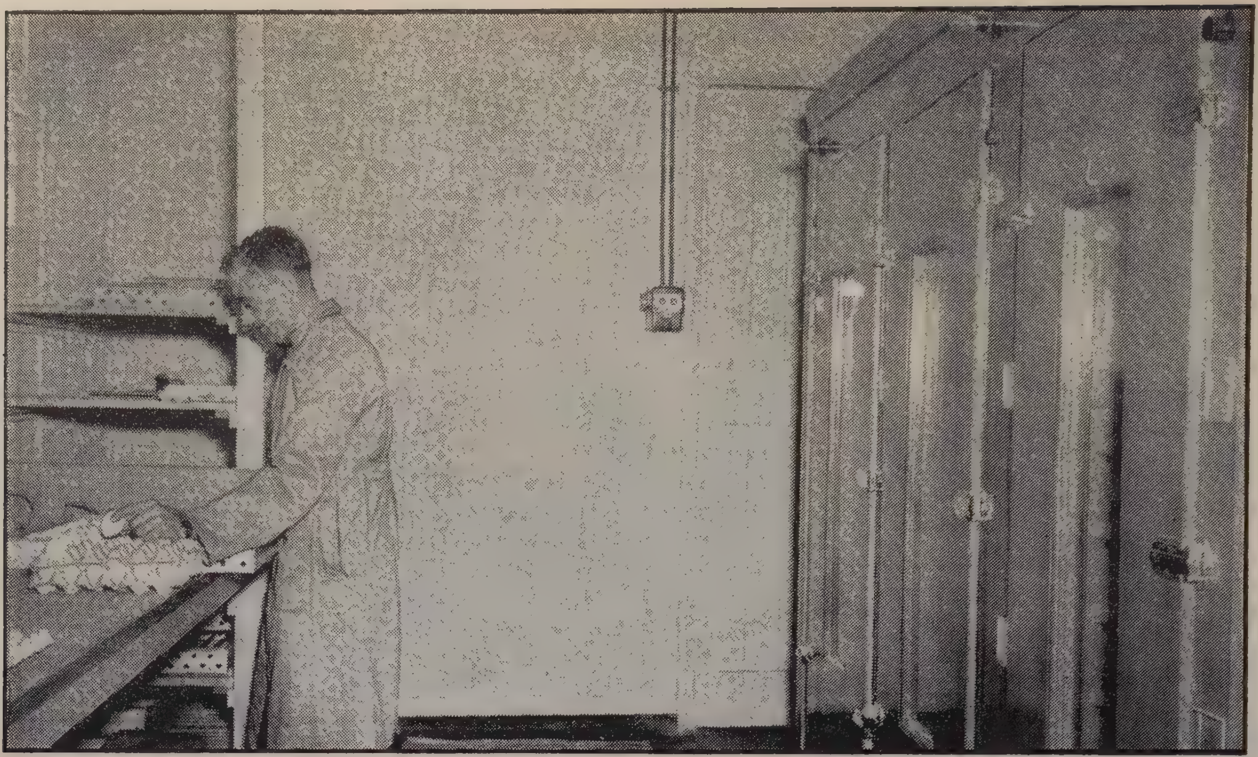
Scabby mouth is a disease which can be readily controlled by preventive vaccination. The method was described in the "Journal of Agriculture" for July 1950, though the Animal Research Station, Wallaceville, no longer provides vaccine as it did at that time. However, the vaccine is readily available at small cost and those requiring it should inquire from their local veterinary surgeon or Livestock Instructor.

If a property is known to be infected, and ewes are brought in, it would be a wise precaution to vaccinate these ewes before lambing; otherwise they may pick up the disease from the lambs later, with the disastrous results mentioned earlier.

The virus is very hardy and will live for several years under ordinary conditions of temperature, etc. It may be assumed therefore that once a property has had infected sheep on it it is infected for all time and the only safe method of control is by vaccination. At the same time it would be unwise to vaccinate lambs unless the disease had been diagnosed on the property.



The face of the lamb whose feet are illustrated above. At the corner of the mouth is a small scab.



Incubation of Eggs

THE most important requirement in a good hatching egg is that it shall have been produced from well-bred stock. However faultless treatment of it after it has been produced may be, nothing can be done to improve the quality of an egg from a poor bird. It is in the breeding pen and not in the incubator room that first efforts must be made toward producing the perfect chick. But hatchability even of eggs from good stock can be reduced by shortcomings in incubator management, and some of the essentials in successful incubation practice are considered in this article by J. H. Jones, Poultry Instructor, Department of Agriculture, Christchurch.

NESTS must be kept as clean as possible. An egg cools after it has been laid, the contents tend to shrink, a slight vacuum forms inside the egg, and through the porous shell moulds or bacteria may be drawn. The cleaner the nesting material is the less chance there is of the eggs becoming infected.

Eggs for hatching should not be washed. Washing tends to spread the dirt or infection over the whole area of the shell, whereas originally it may have covered only a small portion. Eggs should be gently scraped with a dry knife.

The ideal time for an egg to be set would be immediately it has been laid, though there would be very little effect from keeping it until after the seventh day. Eggs kept for more than a fortnight take longer to hatch than fresh ones. The holding of eggs should be practised as little as possible even under the best conditions. The ideal temperature appears to be between 50 and 55 degrees F. For short periods low temperatures will have less harmful effects than high temperatures, which will cause cell division. In eggs held for prolonged periods at either higher or lower temperatures than 60 and 40 degrees respectively the germs tend to die during the first few days of incubation. It is thought that the embryonic development that is under way at the time when the egg is laid should be halted as soon as possible, and for this reason it is advisable to collect eggs frequently, say two or three times a day.

During holding of eggs there is a slight loss of weight due to evaporation, but the most important effect is the weakening of the life-germ. The air in the storage room should be fresh and free from strong currents or odour. Eggs should be placed on racks with the large end uppermost, and if they are set on or before the seventh day will not require to be turned. After a week it is advisable to turn them daily; otherwise the germinal disc, which by force of gravity always rides on top of the yolk, will gradually tend upward through the layer of albumen toward the shell membrane, to which it may become attached owing to the continual slight evaporation of water from the surface of the shell.

Precaution when Setting Eggs

When the eggs are set it is important to watch that the temperature of the incubator is not greatly reduced for too long a period through too many trays of cold eggs being put in. If the temperature is reduced to 90 degrees F., it may take 5 or 6 hours to warm up again to 100 degrees and at this early and critical stage this may have a weakening effect on the embryos and may even cause some to fail to hatch. A few trays at a time should be put in to reduce as much as possible this loss of heat.

Ventilation

Ventilation should receive the closest attention. Lack of proper oxygen supply will be accompanied by an increase in the proportion of CO_2 (carbon dioxide), which will affect the mortality rate if present in quantities above 180 parts in 10,000 in the air. The greater the porosity of the shells the more likely are the embryos to die from this cause. The fact that porosity may vary such a great deal accounts for the fact that bad ventilation does not have a uniform effect over the whole hatch, as would temperature, for instance. During power cuts it is usual to close down the vents, and this is not harmful provided they are opened again immediately the power comes on. Unfortunately it is easy to forget to reopen vents, and such neglect may cause a small percentage reduction in the hatch.

The amount of CO_2 produced by each egg in the incubator is very large in proportion to its size—about 5½ pints in 17 days. Where hundreds of eggs are involved ventilation must be very efficient to keep the air sweet. Inside the incubator this is the business of the manufacturer, but the air in the incubator room must be changed often

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HEADING PHOTOGRAPH: Incubator room containing large cabinet machine, a type which has replaced the flat-top incubator.

enough to be able to feed the necessary oxygen into the incubator.

Cowls operate under the influence of the wind, which causes the air to be sucked out through the roof. For these to work effectively the incubator house must be in a position where the wind is not obstructed, as by tall hedges or high buildings. Otherwise an extractor fan must be used, but this is more costly. The air inlets should be placed as far as possible away from the cowls or extractor; that is, as low as can be arranged and at the farthest end of the room, so that the room will not be bypassed by the air. Inlets should be baffled to prevent direct draught. If the ventilation is efficient, the incubator room will not feel stuffy after having been shut up overnight. If the farmer feels the air oppressive or if there is any tendency to headaches after he has worked there all day, matters should be investigated. The extractor fan has the advantage that its speed may be regulated. More air changes may be necessary in warmer weather.

Best Temperature for Development

The temperature at which the egg will develop best is 100 degrees. In cabinet type machines this applies of course to the whole incubator, and the air is uniform in temperature, as nearly as possible. In the table type machine there is a graduation in temperature from the source of heat at the top to the bottom of the eggs of 4 or 5 degrees, and under the hen there is a variation of as much as 12 degrees, but in each instance the temperature at the centre of the egg is about 100 degrees.

Although fluctuations from this optimum temperature always to some extent upset the even rhythm of development of the embryo, the time at which most harm will be done is in the early stages—in the first 48 hours. As turning in the table type machines means that the eggs will be cooled, they should not be turned during the first 48 hours. In cabinet machines they should be turned as usual.

Humidity Range

During the period of incubation the egg normally loses from 10 to 13 per cent. of its moisture, and some extra humidity will be required so that the loss shall not be excessive owing to the evaporation which takes place due to frequent changing of the air. For most eggs a wet bulb reading of 85 degrees (55 per cent. humidity) is found to give the best results. If, however, it is known that a batch of eggs has thick shells and low porosity, humidity may be reduced with advantage to say 52 per cent. (84 degrees). Eggs having thin shells should not be set.

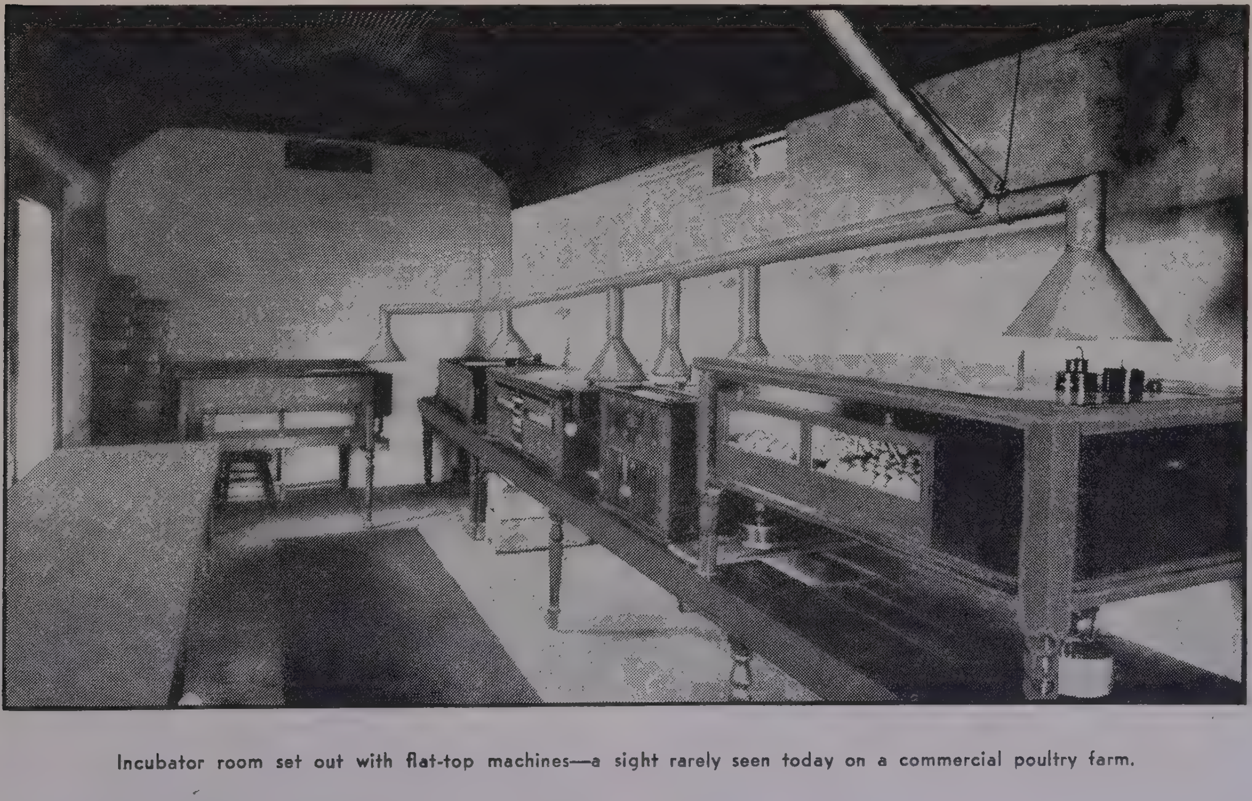
Temperature and humidity must be considered together, because one affects the other. Too low a humidity may cause excessive evaporation and reduce the temperature of the eggs below 100 degrees even when the dry thermometer shows that temperature.

Humidity is often increased while the hatch is in progress, with good results, but the chickens should not be allowed to remain in this atmosphere well into the twenty-second day, as sometimes happens when they await the sexer or the customers. The high humidity will cause the actual temperature to exceed 100 degrees and may have a serious effect on the chicks. The humidity should be brought back to normal once the chicks are hatched.

Turning Eggs

In cabinet incubators it is found that little is to be gained from turning the eggs oftener than 5 times in 24 hours, although there are machines on the market that turn eggs automatically at hour intervals. In table type machines after the first 2 days eggs are usually turned twice a day and sometimes three times. To turn them oftener would reduce the temperature too greatly. They should be given a half turn on to their opposite sides each time. Turning in the early stages helps to prevent the yolk from adhering to the shell membrane by riding up through the albumen. During the later stages turning helps to prevent the various embryonic membranes from adhering to one another and helps the embryo to take up its correct position within the shell. Normally the chick's head should be in the large end and the chick should be curled up so that its beak is in a position easily to peck through the shell. In about 25 per cent. of eggs there is a tendency for the chick to develop in the wrong position, and this may be rectified by frequent turning.

A great deal of study has revealed the stages in the development of the chick from the egg, but the why and wherefore of it still remain a mystery. Poultrymen are concerned with making this phenomenon take place as smoothly as possible by careful attention to its exacting requirements. Success in this, as in any other venture on the farm, cannot be bought cheaply, but comes only through infinite attention to detail.



Incubator room set out with flat-top machines—a sight rarely seen today on a commercial poultry farm.

OLD AND NEW METHODS OF DISPOSING OF PRUNINGS

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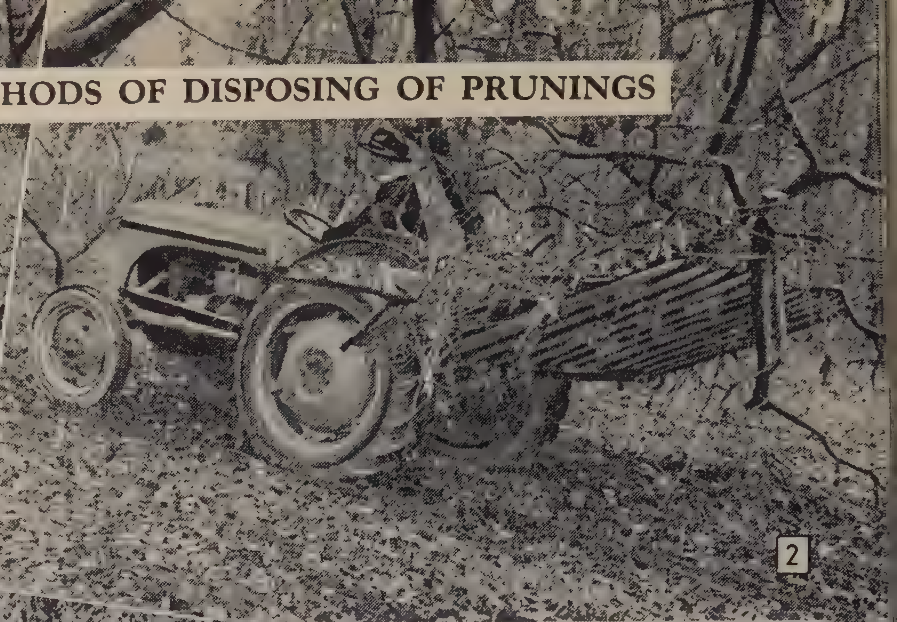
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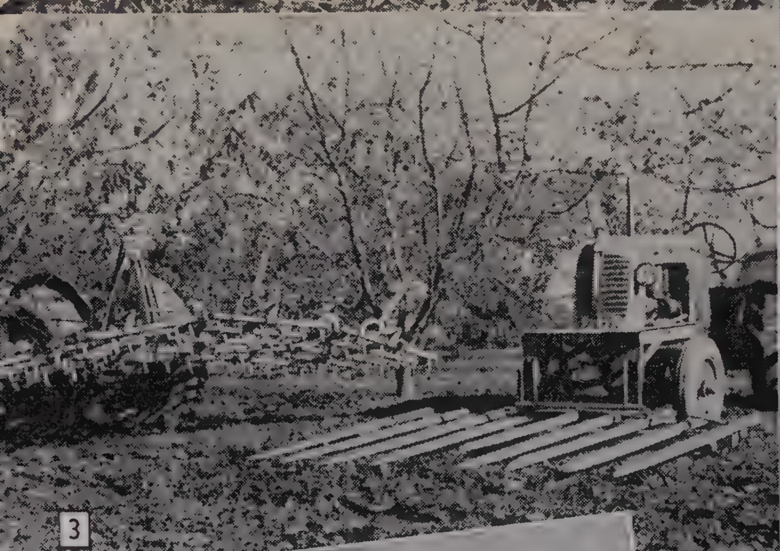
1—Pruning sheets beneath a young peach tree. These sheets are being superseded by mechanical methods. 2—The prunings are lifted and carried to the burning heap. 3—An up-to-date method is the combination of harrows and hay sweep. Hydraulically operated harrows are used to rake the prunings into windrows, which are later removed by the sweep attached to a second tractor. If the sweep is also hydraulically operated, a further advantage is gained, especially on uneven ground. 4—A typical burner which can be drawn easily by one man. 5—A more efficient tractor-drawn burner made of steel bars and provided with runners. Wire netting along each side prevents prunings from falling out and the bars forming the floor of the burner are so spaced that only ashes fall through and adequate draught is allowed.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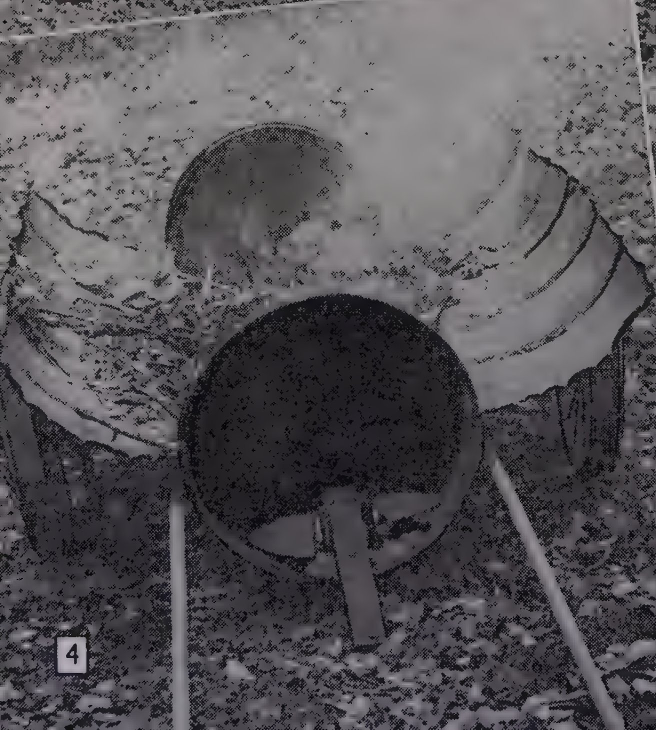
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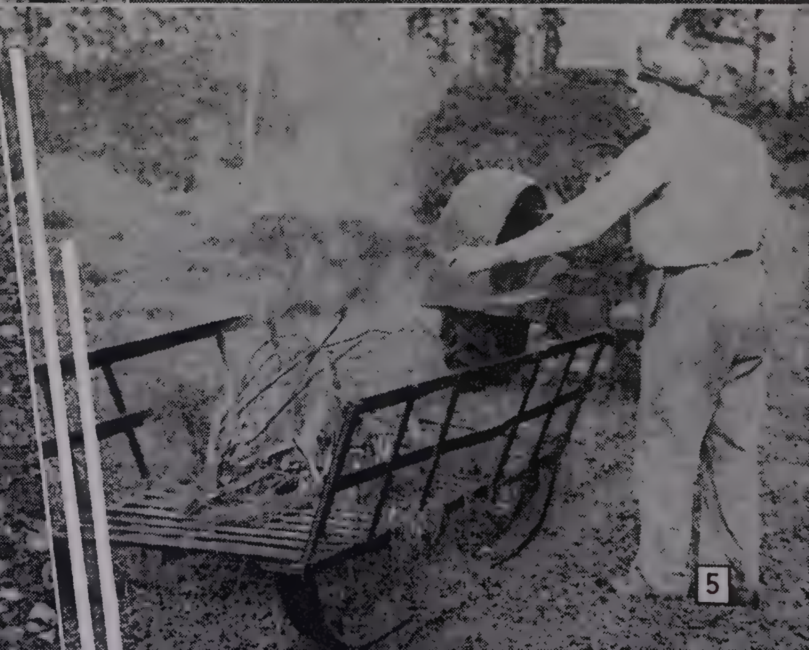
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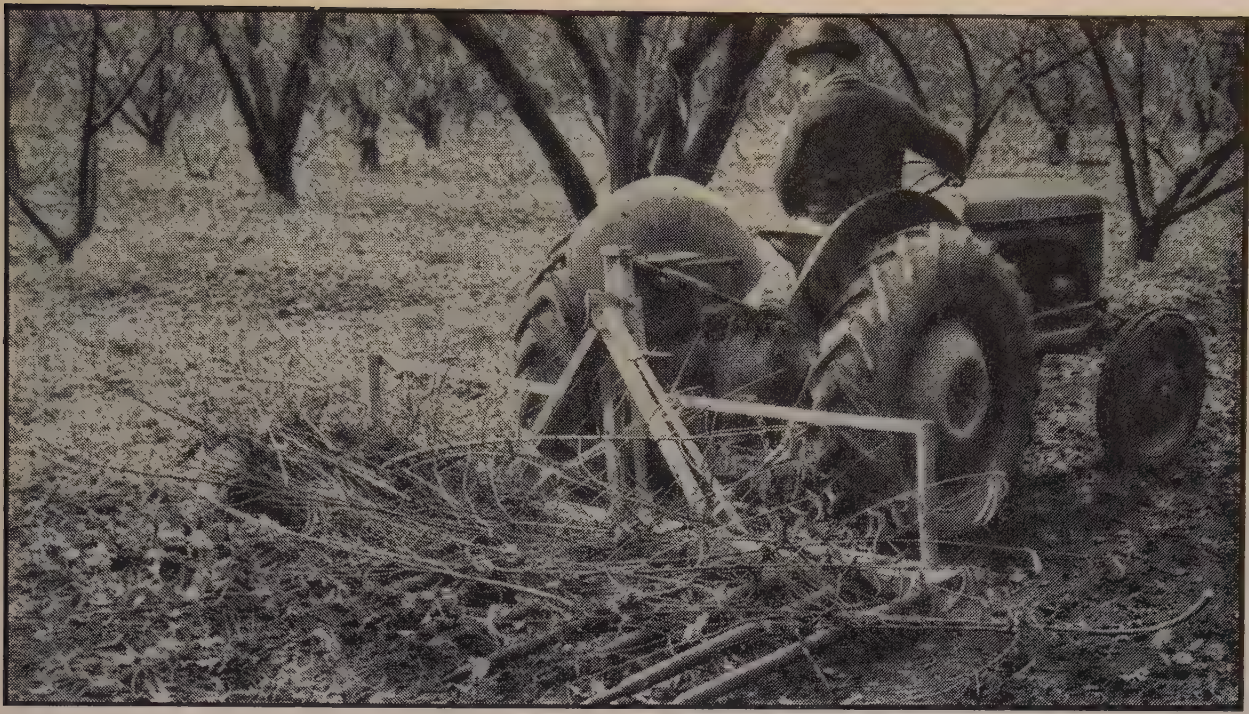

Methods of Collecting and Disposing of Prunings

THE slow and arduous task of picking up and burning orchard prunings by hand is gradually becoming outdated with the introduction of more modern methods. With the tendency toward an increase in mechanisation in orchards many fruit growers now use their tractors to do this job in a fraction of the time of hand work and at greatly reduced cost. The various methods used by orchardists are outlined in this article by N. B. Congdon, Horticultural Instructor, Department of Agriculture, Hastings.

A COMMON practice is to remove the heavier prunings and to disc in the remainder. It is claimed that this adds humus to the soil and saves time and labour. However, where a large quantity of wood remains on the ground most growers feel it necessary to remove and destroy as much of it as possible, leaving only the smaller and softer prunings to be worked into the soil.

Progressive Burning

One method is to burn prunings progressively as the orchard is pruned. Prunings are collected by hand or with a fork and thrown into a portable furnace. This can be made of a halved 40-gallon drum or a larger tank which is attached to a chassis mounted on wheels. The furnace is usually made light enough to allow it to be pulled by hand from one part of the orchard to another. Once a good depth of embers is built up prunings burn easily, but holes should be made in the drum to create a draught. Larger limbs often require trimming to make them settle into the drum as they burn.

Pruning Sheet

The pruning sheet has been used fairly widely in the past, but nowadays has generally given way to more modern methods. Usually the sheet is composed of two pieces each measuring 20ft. x 10ft., but occasionally it is divided up the middle only as far as the centre. Sheets are placed beneath the tree before pruning and moved on to successive trees until the sheets are filled. Prunings are then emptied into heaps and from there forked either into portable burners, loaded on to trailers, or removed by hay sweep to a large stack for burning. Sheets are usually hessian, which is light and relatively durable.

Modern Mechanical Methods

The most modern methods require a tractor with various attachable implements. A harrow may be used to advantage in collecting most of the prunings into windrows. A hay sweep attached to the front of the tractor may then be used to remove the rows of prunings to a common heap for burning. If two tractors are available, the sweep attached to the second tractor can take up the rows of prunings almost immediately. With this latter method it is possible to dispose of prunings from a 10-acre orchard within 2 to 3 days. Sometimes difficulty is experienced where ground is uneven and breakages of wooden prongs are unavoidable. The sweep method works more efficiently where the ground is level and where metal prongs bent slightly upward at their extremities are used. When the height of the sweep above ground can be controlled hydraulically, working on uneven ground is no longer a problem.

HEADING PHOTOGRAPH: The tractor, driven in reverse, collects prunings from the ground by use of a hydraulically operated buckrake mounted on the rear of the vehicle.

Use of Buckrake

A hydraulically operated buckrake drawn by a tractor is used by some growers. With this equipment one man can remove prunings from a 5-acre pip fruit block in a day. On very uneven ground it may be necessary to use harrows for placing prunings in rows, but usually the buckrake is the only implement required, as the hydraulic control allows the rake to be set and regulated according to the ground level. The buckrake is solidly constructed of steel and as well as being capable of gathering the heaviest of limbs it can be used also for compacting prunings on the heap. The only disadvantage of this method is that the operator is working backward and some physical inconvenience is thus incurred.

Usually three or more fires are required to keep up with the rapid inflow of prunings by either the buckrake or hay sweep methods. Fires are placed at headlands or on waste ground well away from fruit trees.

It has always been found difficult to burn prunings placed in a heap by hand. The prunings are not consolidated sufficiently for a fire to consume the heap completely. When heaps are made with a sweep or buckrake they can be compressed by the tractor and once a fire is well started it will consume the whole heap rapidly. To create a good initial blaze old tyres, waste oil, or the contents of fire pots can be used.

Pollination of Japanese Plums

By A. T. J. WATTS, Stone Fruit Specialist, Department of Agriculture, Christchurch

SOME varieties of Japanese plum are self-fertile, that is, they will set a crop without being pollinated by another variety, but many are only partially self-fertile, and when self-pollinated do not set a full crop. Others are self-sterile and must be cross-pollinated before any fruit is set. Very few home gardeners have room for more than one or two trees of any kind of stone fruit, so that more thought must be given to the choice of varieties, or combinations of varieties, to ensure satisfactory crops than would be necessary in a large mixed planting.

AS far as is known, any of the standard varieties of Japanese plums grown in New Zealand will pollinate any other variety successfully, provided their flowering periods overlap sufficiently; there are no incompatible groups, though some varieties are better pollinators than others. However, in addition to blossoming dates several other factors must be taken into consideration to ensure regular cropping. Very often bees are present in only small numbers early in the season, and lack of competition may allow individual bees to concentrate on a small area, perhaps only one tree, so that there is no cross-pollination, especially if trees are far apart. Sometimes, too, flowers of other plants (including weeds and cover crops) may be more attractive sources of pollen or nectar, so that fruit blossom is neglected.

Nutrition of the tree is important; if insufficient food, especially nitrogen, is not available to the tree at blossoming time, the set is likely to be poor.

If a single tree consistently bears little or no fruit and lack of a pollinator is thought to be the cause, there are several methods of overcoming this. The most satisfactory way is to plant a tree of a known pollinator close to the existing tree; if this is impracticable, several small branches in the top of the tree may be worked over to a pollinating variety by grafting. As a temporary expedient, when the tree is in blossom, small flowering branches of a pollinator may be placed in tins or jars of water and hung up in the tree or placed close to it; these bouquets should be fairly high, as blossom on the ground or in the lower parts of the tree is less likely to be visited by bees.

The table at right lists the pollinators believed to be effective for most of the commonly growing Japanese plums. Many of these are of local or Australian origin, and little work has yet been done on their compatibilities or pollination requirements; most of the information is therefore based on observations of growers and Instructors of the Horticulture Division.

Another point that restricts their value is that time of blossoming is influenced by many factors, including soil, climate, rootstocks, and cultural methods. The degree of overlap in the flowering dates of any two varieties will also vary from district to district and even from season to season in the one district. The list should therefore be regarded as making suggestions only, not as embodying recommendations applicable under all conditions.

No.	Variety	Fertility	Suggested pollinators
1.	Alpha	SS	2, 4, 17, 19, 29, 31
2.	Billington	SS	1, 7, 12, 14, 19, 24, 27, 28, 29, 31
3.	Booth's		12, 19
4.	Burbank	SF	1, 7, 8, 11, 16, 23, 24, 26
5.	Doris		7, 16, 17, 19, 23, 27
6.	Duff's Early Jewel	SF	
7.	Early Sultan		2, 4, 5, 12, 17
8.	Elephant Heart (Masterpiece)	SS	4, 12, 23
9.	Epoch		12
10.	Ford's Early		17
11.	Formosa	Sf	4, 16, 19, 26
12.	George Wilson (Omega)	SF	1, 3, 7, 8, 9, 14, 18, 23, 25
13.	Hermosillo		31
14.	Mariposa	SS	2, 12, 23
15.	Narrabeen		19, 22
16.	October Purple		4, 5, 11, 17, 26
17.	*Purple King		1, 5, 10, 16, 21, 24, 30, 31
18.	Improved Purple King		12, 27
19.	Santa Rosa	SF	1, 2, 3, 5, 11, 15, 20, 22, 24
20.	Satsuma	SF	19
21.	Sharp's Early	SF	17, 31
22.	Shiro		15, 19, 26
23.	Sultan	Sf	4, 5, 8, 12, 14
24.	Vaile's Early		2, 4, 17, 19
25.	Victory		12
26.	Wickson	SS	4, 11, 16, 22
27.	Wilson's Early	SF	2, 5, 18
28.	Wright's Delicious	SF	2
29.	Wright's Early	SF	1, 2
	Other Species		
30.	Evan's Early (European)		
31.	South Australian Cherry Plum (Myrobalan)		

SF Believed to be self-fertile. Sf Believed to be partially self-fertile.
SS Believed to be self-sterile.

* Any cultural treatment which reduces the vigour of Purple King appears to assist setting.

Control of Rushes in Tauranga County

By A. V. ALLO, Instructor in Agriculture, Department of Agriculture, Tauranga

IN the last 3 years a number of experiments have been carried out in Tauranga County in an attempt to control rushes with hormone weedkillers. Much of the coastal country in the Te Puke district consists of a large area of partially drained swamp country of a peaty loam soil type that is fairly wet in winter and on many parts of which rushes grow in profusion. There are two main species of rush on the area, *Juncus effusus* and *Juncus pauciflorus*, the former being the soft rush eaten by stock in winter and the latter the wiry, hard rush which stock will seldom if ever touch.

Trials have been conducted on both these species, and the areas selected ranged from very wet paddocks which are waterlogged throughout the winter to relatively well-drained country on which rushes are not so serious a problem. In all trials the most heavily infested portion of the field was selected for treatment, and the purpose was to find a method of treating rushes that would give a reasonable degree of control at an economic cost. After 3 seasons' experimenting it is now considered that a large part of the answer has already been obtained, though it must be stressed that this is only an interim report.

It has been found that the first essential is to mow the rushes in November or early December and to spray the regrowth when it is 12 to 18in. high, usually 6 to 8 weeks later. Spraying of uncut rushes has given rather poor results, as also has the spraying of the stumps of freshly cut rushes.

Of all the hormone weedkillers tried best results have so far been obtained from the use of ethyl ester of 2,4-D applied at the rate of 1½ to 2lb. of acid equivalent per acre in 22 gallons of water; this was sprayed through 32 fan nozzles at a pressure of 40lb. per square inch, and the tractor speed was 2 miles per hour. On easy country where greater tractor speed is possible better control is obtained if the above rate of hormone is applied in 30 to 40 gallons of water per acre and low volume nozzles are used. This necessitates traversing the area twice and where possible the second application should be at right angles to the first.

The use of the amine salt of 2,4-D at 2lb. of acid equivalent per acre is also giving very promising results, though this material has been tried for only a season and final judgment cannot be passed on it until next spring, when the plots can be examined for regrowth. Best results have been obtained on *Juncus effusus*; results from spraying of *Juncus pauciflorus*, though not so striking, are still very good.

Farmers should not expect rapid results after spraying. The first symptoms are a browning of the tips of the leaves, usually showing up 2 to 3 weeks after spraying. This browning continues along the leaves, which after about 2 months show a distinct brown to black at the base of the plant. At this stage they pull out of the clump very readily, usually a sign that the plant will be killed.

As a result of these experiments several farmers in the Te Puke district have sprayed areas themselves, and several have obtained from 60 to 90 per cent. kills of rushes. It is considered that hormone weedkillers offer a very promising means of controlling *Juncus effusus* and *Juncus pauciflorus*, but it must be stressed that they will give complete and permanent control only if drainage of the area is improved to permit excess water to get away. If the ground is still allowed to get very wet each winter, fresh seedlings will come away again and the control effected by the hormones will give only temporary relief.

Replacements for the Household Poultry Flock

WITH the arrival of another breeding season there are household poultry keepers who consider the possibilities of setting a broody hen to raise pullets with which to replace their birds when they have completed their laying for the year. The practical aspects of adopting this method of replacing the household flock are reviewed in this article by the Animal Industry Division.

IN last month's issue of the "Journal" it was suggested that for the average family it is necessary to keep at least 8 laying birds if an adequate supply of eggs is to be available throughout the year. This envisages two essentials; namely, that these 8 birds shall be pullets capable of giving reasonable winter egg production and that some eggs from the flush (spring and summer) period will be preserved for use in winter to augment the fewer eggs laid during that "out of season" period.

Thus the householder who considers hatching and rearing replacement pullets must aim to have at least 8 well-grown and healthy birds ready to replace the current season's layers when they go out of lay about February or March. In the first place this means hatching the replacement chicks at the end of August or early in September, which allows about 5 to 6 months for these new pullets to come into lay from the date of hatching them. This means that one or more broody hens must be available in August and hatching eggs secured. This raises the important issues of how many hatching eggs will be required and how many broody hens will be needed to cover these eggs. It is desirable for hatching to use a heavy breed bird or at least a crossbred. Such birds will cover on average 13 eggs.

[Fraser Niederer

A heavy-breed bird (Barred Rock) which has gone broody. The hen after being lifted does not desert the eggs.

Two Broody Hens

If 13 good hatching eggs are purchased, it is reasonable to expect 10 chicks, but of these half are likely to be cockerels or there may be a preponderance of cockerels. Therefore the setting of one broody hen is insufficient for raising 8 replacement pullets; at least two will have to be set.

Further, it is desirable that these new pullets should all be of approximately the same age so that there is not a wide difference in sizes when the time comes for them to run together after leaving the mother hens which reared them, and to ensure that they come into lay at about the same time. Therefore the two broody hens must be set at the same time or at least within a week of each other.

With proper care there should be very few losses with hen-reared chicks. Nevertheless the possibility of losing one or two chicks by ill fortune must be considered, because if such losses occur the chances of rearing 8 good pullets to the laying stage is reduced considerably.

The setting of two broody hens on 26 eggs does not leave much margin for mishaps if 8 laying pullets are needed. With a hatch giving a preponderance of pullet chicks and good rearing two broody hens are enough, but if there is a preponderance of cockerels and misfortune during rearing, the householder is likely to be short of his requirements.

Getting Broody Hens at Right Time

An initial difficulty may be to secure broody hens. If they are to come from the householder's own flock, no eggs can be set until one or more of the laying birds go broody—not partially broody, but fully broody so that the bird will sit satisfactorily. As there is no way by which laying birds can be induced to go broody, it will be a matter of chance as to whether the householder has one or more broody birds ready to sit on eggs at the right time. Even on commercial farms, where there are large numbers of pullets and hens, it is not always possible to get broody birds exactly when they are wanted.

The householder may decide to purchase broody hens from a nearby commercial poultry farmer. He has a better chance there of securing birds when wanted than from his own flock, but apart from this aspect he retains hens in production which would go out of lay if allowed to go broody. Broody hens used for hatching and rearing chicks will be out of production for at least 3 months, which represents a serious loss of eggs.

Extra Housing Needed

From what has been said already household poultry keepers will realise that it is not advisable to attempt to replace their laying birds each year by purchasing hatching eggs and placing these under broody hens. It may appear to be a comparatively cheap method of restocking the laying shed, but there are too many risks and there is a further item which adds to the apparently low cost. When raising chicks under hens it is necessary to provide a suitable coop for each hen for use during the brooding stage, and later when the young, growing birds leave the hen there must be a suitable shed in which to house them until they are ready to go to the laying shed.

Hatching and rearing of chicks can be carried out by the householder who has a section slightly larger than is usual and who is prepared to build the additional housing and equipment required, but for many household poultry keepers it is not a sound proposition. For this reason the majority of household poultry keepers purchase perching or grown pullets to restock their laying sheds.

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Utility Poultry Standards

"THE breeding of animals or birds for beauty, productiveness, or any other specific purpose has always held a particular fascination. The height of achievement is perfection for whatever purpose the animal or bird is required. It is essential, therefore, to draw up a standard of perfection for the classes of stock in which breeders are interested."

The above extract from the introduction to "New Zealand Utility Poultry Standards of Perfection and Breeding of Poultry" states concisely the objects of the publication. It was published by the Department of Agriculture at the request of the North Island Poultry, Pigeon, and Cage Bird Association, the South Island Poultry, Pigeon, and Canary Association, and the New Zealand Poultry Board.

Within 80 pages the book gives standards, with illustrations, for the better-known utility breeds of poultry, including Indian Runner, Khaki Campbell, and Pekin ducks. A general section describes preparation of birds for show, principles of breeding, selection of stock for commercial breeding, the Poultry Flock Improvement Plan, and laying trials.

Copies of the book can be procured from the Department of Agriculture's offices in Auckland, Palmerston North, Hastings, Wellington, Christchurch, and Dunedin at 5s. each.

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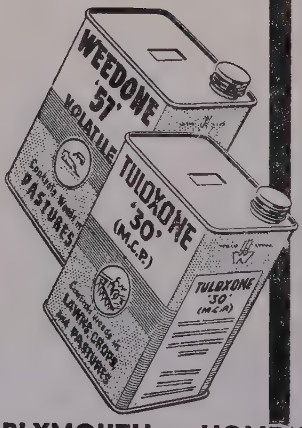
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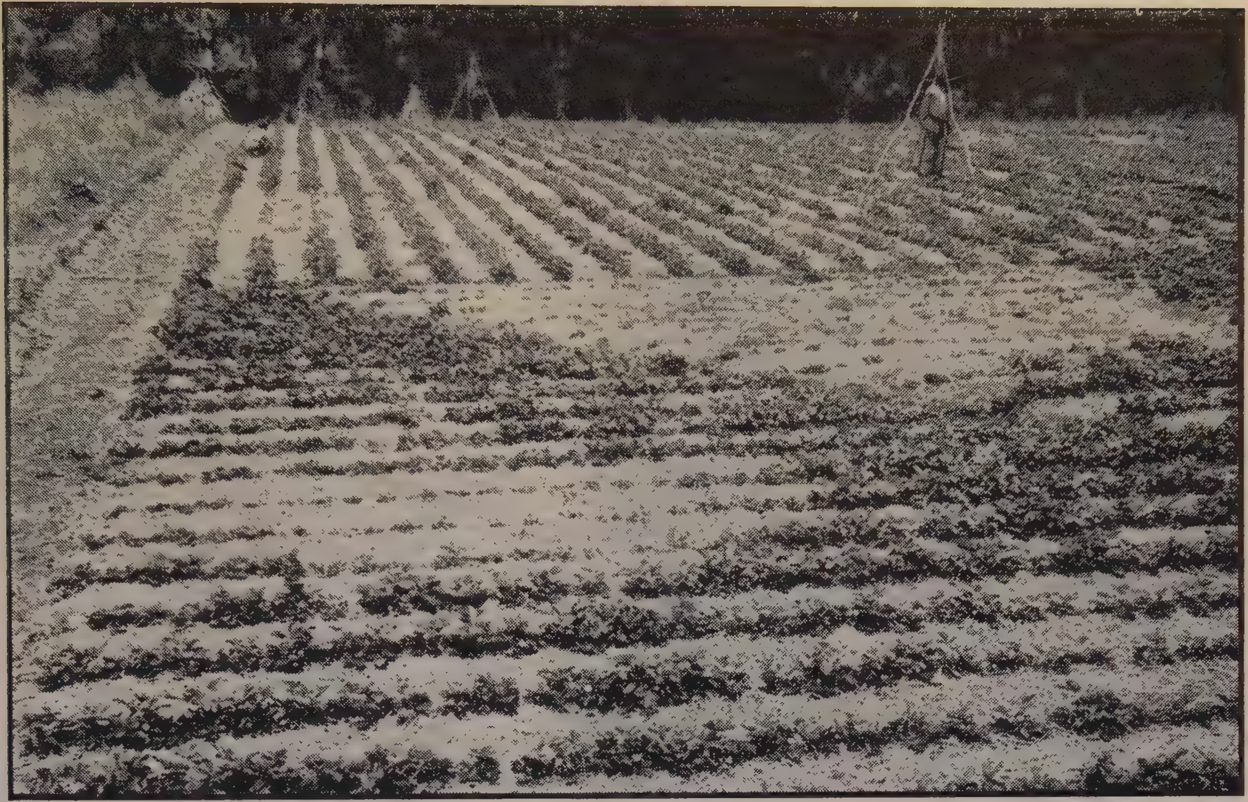


HEADING PHOTOGRAPH: Strawberry bed, showing an infection of red core root rot in the middle of the illustration. Sparrow photo.

Propagation of Strawberry Plants in Waikato and Coromandel Areas

AS the strawberry is a perennial plant which does not breed true from seed, the demand of commercial growers for plants of uniform quality free from disease rests on vegetative propagation by runners. Plants raised in this manner perpetuate the characteristics, both good and bad, of the parent plant. Therefore, the value of rogueing so that healthy, disease-free plants are available to growers of strawberries cannot be over-emphasised. Methods of propagation and culture practised in the Cambridge and Tirau (Waikato) and Coromandel districts are discussed in this article by C. E. K. Fuller, Horticultural Instructor, and R. E. Yates, Horticultural Inspector, both of the Department of Agriculture, Hamilton.

FOR maximum, high-quality berry production in the Auckland Province the strawberry is grown as an annual crop, maiden runner plants being set out in May of each year. To meet the demand for plants some 2,500,000 are raised annually in runner plant nurseries near Whitianga (Mercury Bay), Cambridge, and Tirau, areas which receive a fairly high summer rainfall. The runner beds are usually planted on a fresh area of friable, free-draining soil each year. Such conditions, under normal circumstances, favour free production of runners, the resultant plants being made available to growers through various fruit and produce marketing organisations.

Most nurseries are run in conjunction with dairy farming, individual beds ranging in size from less than ¼ acre to 2 acres, the largest producing about 750,000 plants annually.

Varieties

Captain Cook is the only variety raised on a large scale, as it is virtually the only variety used by northern commercial strawberry growers. The recently introduced varieties Auchincruive Climax and Perle de Prague have been tried on a limited scale, but runner production has been unsatisfactory in these districts.

Soil Preparation

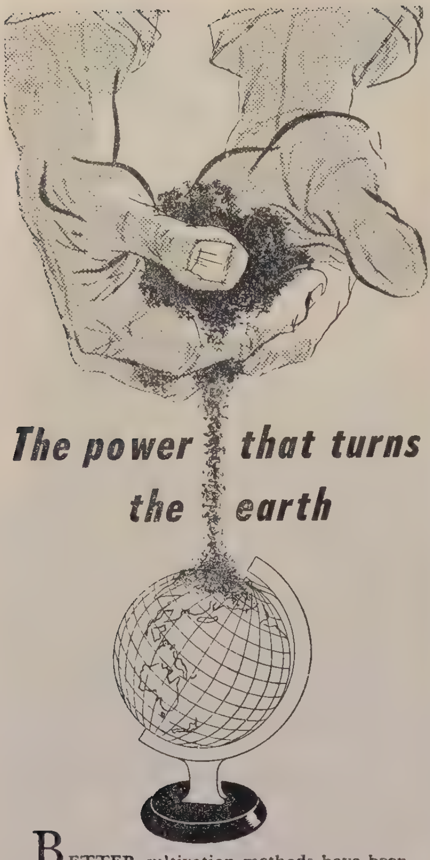
Preparation of the nursery bed is begun during autumn, the area to be used generally being ploughed out of pasture and temporarily fenced against livestock. Subsequent cultivation is sufficient to destroy any weed growth before the area is finally brought to a tilth suitable for the planting of the parent or mother plants in early spring.

Mother or Parent Plants

The mother plants used vary in age from first-year maiden runners to 5-year plants. These should be selected for strain and freedom from disease. Careful selection to ensure that the plants are free from virus disease and red core root rot infection is important and, for this reason, it is necessary to rogue mother plants heavily to ensure beds of runners free of disease. Mother plants are normally selected from the grower's own stock, but sometimes, when beds become degenerated through virus disease, new stock must be brought in.

Planting out

Planting out of the runner beds begins in early spring (usually September). Plants are spaced fairly close in the rows, the average planting distance being 1ft. between plants, but wide spacing (about 3ft.) between rows allows cultivation by machinery



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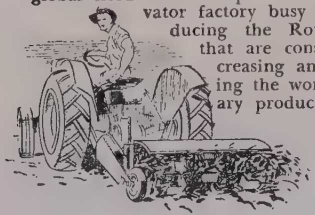

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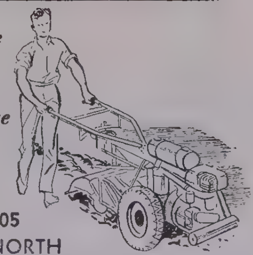

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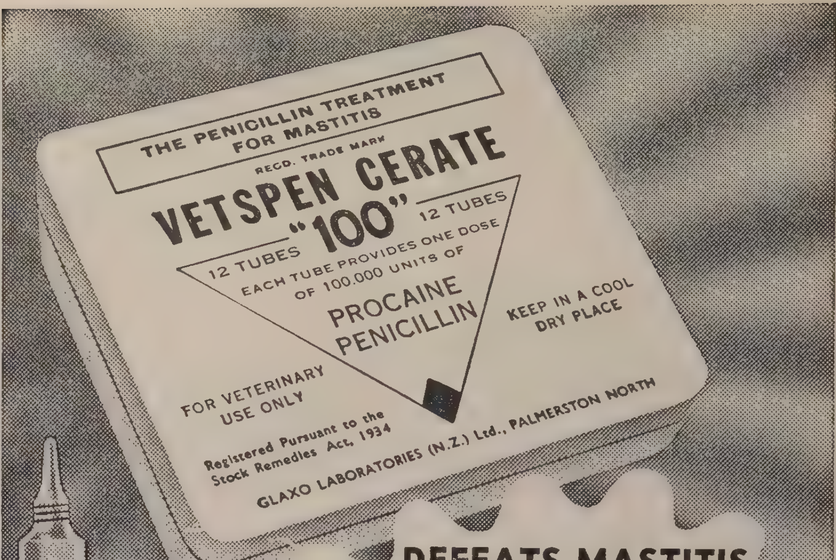
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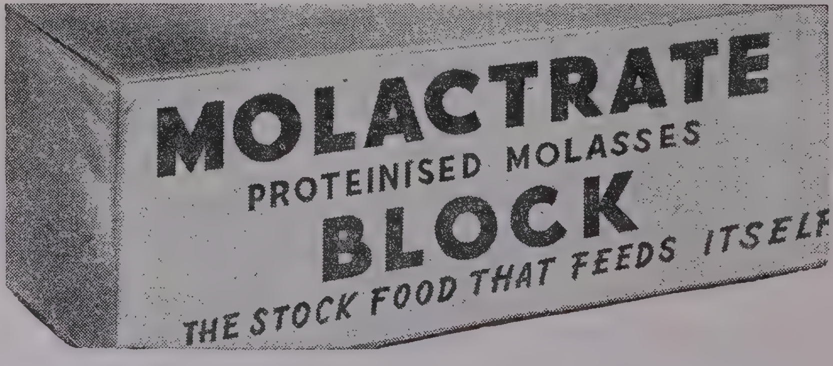
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and efficient rogueing of diseased plants up to a fairly late stage.

Closer planting is often practised to minimise the reduction in the total number of runners from a given area resulting from rogueing out of diseased plants, but is not recommended. Plants growing too closely together produce such a tangled mass of runners that they cannot be rogued efficiently.

Culture

Cultivation after planting, although frequent, is shallow and is aimed at securing good weed control until the developing runners cause it to become impracticable.

Flowers are picked off as they appear later in spring so that fruiting is suppressed and the energy of the plant is concentrated on runner production. Some growers hesitate to adopt this practice in the belief that virus diseases may be spread from plant to plant by contaminated hands, but strawberry virus diseases cannot be spread in this manner, the strawberry aphis (*Pentatrichopus fragariae*) being the only vector.

On the cessation of cultivation the beds are left, except for any necessary rogueing, until digging begins. The reason for keeping off the beds at this period is that unnecessary compacting of the surface soil is avoided and thus good rooting conditions for the plants are maintained.

Manure is seldom used in the propagating beds, the hardy plants produced without fertiliser normally making good growth when planted into fruiting beds. However, when there is an obvious lack of one of the main elements, a light dressing of the required fertiliser should be applied.

Digging and Packing

Digging begins during May, plants being lifted and forwarded as required to fruit and produce organisations who supply growers or, sometimes, direct to growers.

The forwarding of plants as required, so that rate of digging does not exceed rate of planting, enables growers to receive plants in a relatively fresh condition. Digging on the larger nursery beds is usually carried out by contract Maori labour, the digger loosening the plants with a fork and keeping just ahead of the picker. The latter pulls, places, and ties the plants in bundles of 50, having first discarded the mother and any unthrifty plants. Immediately following is the packer, who puts the bundles in sacks or boxes. Plants awaiting dispatch are placed in the shade, usually beneath a hedge or tree, though a tent is sometimes used if there are no trees handy.

Pests and Diseases

Strawberry growers are dependent on the plant growers for disease-free plants, which are essential for successful berry production, and all nurseries are registered and inspected by officers of the Department of Agriculture. Unlike England, New Zealand has no plant certification scheme for strawberries.

Strawberry plants are subject to attack by a number of pests and diseases and nursery beds are isolated from the main growing areas in an attempt to avoid disease infection. Despite this, most beds require attention to control pests and diseases during the year. Descriptions of the major diseases affecting nursery beds and of control measures follow.

Virus Diseases

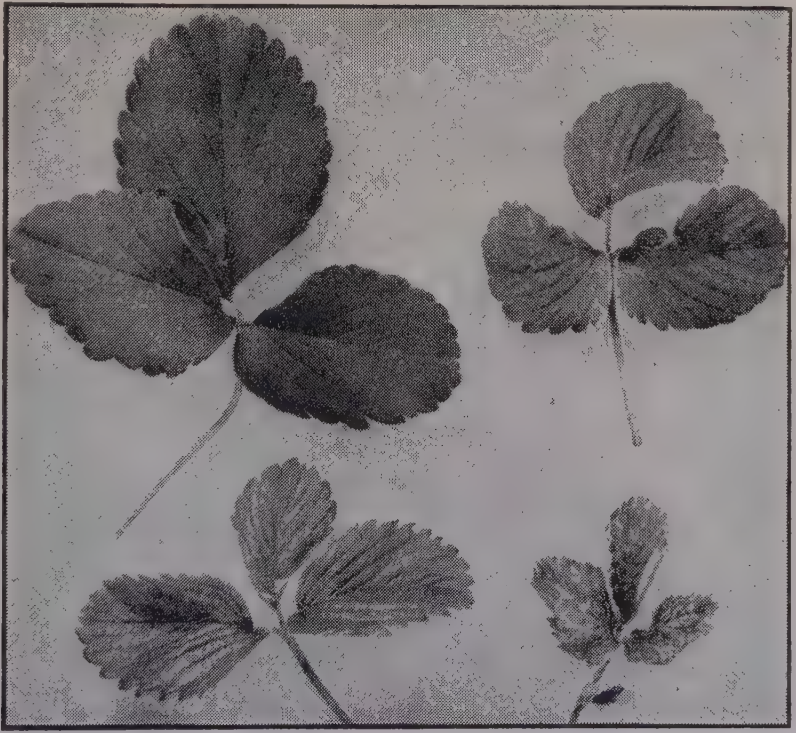
Virus diseases, which cause degeneration, are transmitted by only one species of aphis (*Pentatrichopus fragariae*) and are usually introduced into strawberry gardens by the planting of infected runners. They are the most serious diseases affecting strawberries in New Zealand and other countries and probably have been the prime factor in the reduction of areas and yields in this country in the past. Two strains of virus are peculiar to the strawberry, yellow edge and crinkle.

[*Sparrow*

Plant infected with the virus disease strawberry yellow edge as compared with leaf of healthy plants.

Yellow edge: This causes a general dwarfing of the youngest leaves and a shortening of the petioles, together with a yellowing of the leaflets, which is more pronounced at the edges. The plant appears flattened, compared with a healthy one, owing to the dwarfing of the petioles of the leaves nearest the centre of the plant.

Crinkle: This may be as prevalent as yellow edge in some districts. The symptoms consist of a crinkling of the young leaves accompanied by yellow (chlorotic) spots, with or without



Healthy strawberry leaf (upper left) and leaves showing distortion, crinkling, and spotting caused by the crinkle virus.

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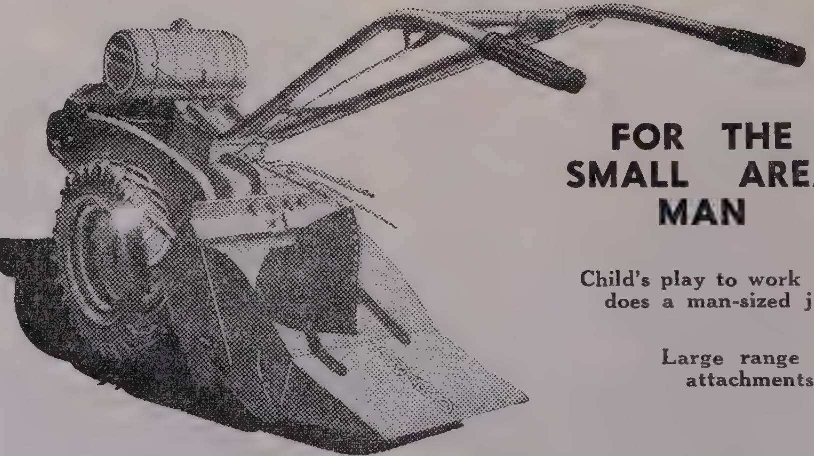

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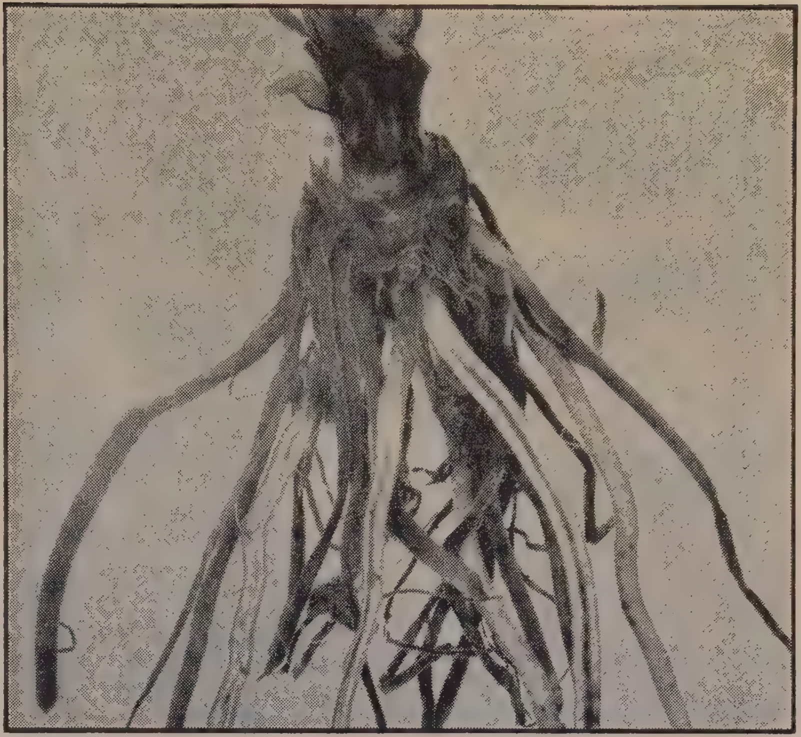
small, red, necrotic (dead) centres and a dwarfing of the plants.

Often in mild infections these virus diseases cannot be detected by the symptoms described until autumn, as hot weather tends to mask the disease, but the symptoms usually become visible in autumn, when temperatures are lower. Severe infections, however, can be detected readily by the general dwarfing of the plant and its failure to develop normal runners.

Control: Infected plants do not recover and should be dug out and destroyed by burning as soon as the infection is detected. The degree of spread may be reduced by the control of the aphis by spraying (see section dealing with insects). A practical method of dealing with the trouble is rigorous inspection and rogueing to eliminate all visibly infected plants and thus the building up of a stock of plants as free from disease as possible. This is a long-term procedure, but if adopted by all plant growers, would bring about an improvement in planting stock.

Rogueing: Too much emphasis cannot be placed on the value of thorough and frequent rogueing to eradicate virus-infected plants from beds. This is particularly important in virus-tolerant varieties such as Captain Cook, in which virus cannot be detected until it is so severe that it induces degeneration and unthrifty plants. In an infected plant the virus permeates the entire plant system, including every runner plant produced. Thus every one of the progeny of an infected mother plant is a potential source of infection when planted in fruiting beds. This can go on until all existing plants of a variety are infected with virus disease to a greater or less extent. Rogueing should be done when the first signs of infection are seen and in the nursery bed can be carried out at any time. To facilitate this, even wider planting of both the plants and rows would be advantageous. Infected plants should be taken from the nursery beds and burnt.

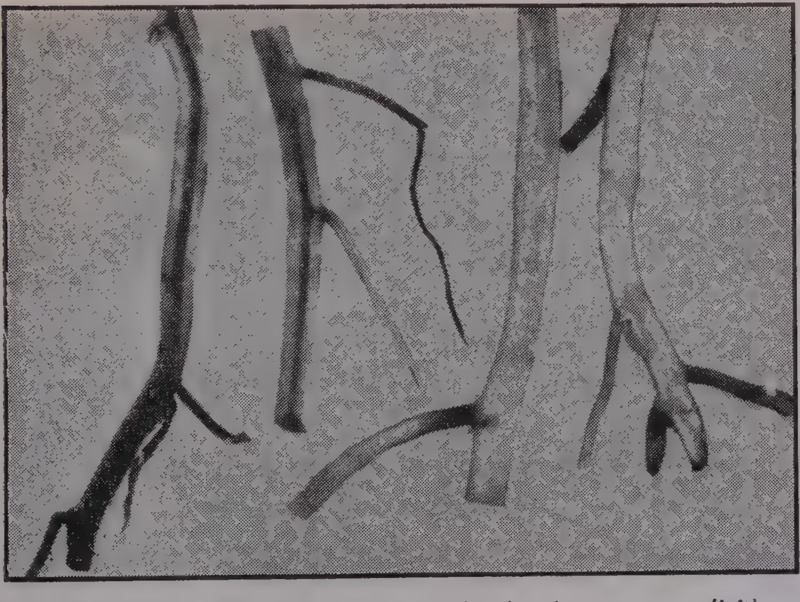


Plant (slightly enlarged) infected with red core root rot. A feature is the absence of small feeding roots.

Insect Pests

Strawberry aphis (*Pentatrichopus fragariae*): This aphis commonly attacks strawberry plants throughout New Zealand, but infestation only occasionally reaches such serious proportions as to devitalise plants by the amount of sap extracted and so cause crop reduction. However, the aphis must be considered a serious pest even when present in small numbers, because it is the sole means of transmitting the virus diseases of strawberries in New Zealand.

The aphides transmit virus by feeding on the sap of infected plants and injecting virus into healthy plants when they transfer to feed on them. In this way a considerable reduction of crop can be brought about in one season. As aphides multiply very rapidly, control measures should be adopted as soon as they appear.



Longitudinal sections of strawberry roots infected with red core root rot (left) and healthy roots (right).

Control: Beds should be sprayed periodically, as necessary, with one of the following:—

1. **One per cent. of summer oil plus nicotine sulphate 1 : 800:** To make 100 gallons use 1 gallon of summer oil, 1 pint of nicotine sulphate, and 100 gallons of water. To make 4 gallons use 6½ fl. oz. of summer oil, 4/5 fl. oz. of nicotine sulphate, and 4 gallons of water.

2. **Hexaethyl tetraphosphate (H.E.T.P.) 1 : 1600:** To make 100 gallons use ½ pint of H.E.T.P. and 100 gallons of water. To make 4 gallons use 2/5 fl. oz. of H.E.T.P. and 4 gallons of water.

3. **Tetraethyl pyrophosphate (T.E.P.P.) 1 : 1600:** To make 100 gallons use ½ pint of T.E.P.P. and 100 gallons of water. To make 4 gallons use 2/5 fl. oz. of T.E.P.P. and 4 gallons of water.

Fungous Diseases

Leaf spot (*Mycosphaerella fragariae*): Leaf spot is probably the most common fungous disease affecting strawberries in New Zealand. Attacks

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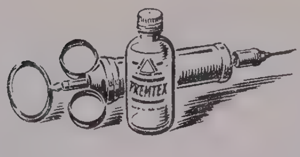

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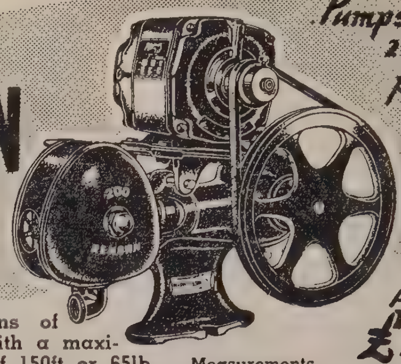

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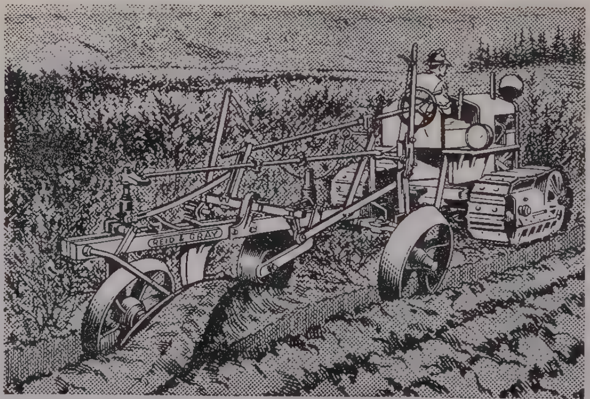

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are usually confined to the foliage, where the symptoms show as small, circular spots, at first reddish brown but later becoming greyish from the centre outward with a reddish margin. The spots enlarge and may run together, which reduces the functional area of the leaf, thus restricting growth of the plant.

Control: A Bordeaux 5 : 4 : 50 spray should be applied in spring, after which routine spraying of Bordeaux 3 : 4 : 50 should be carried out throughout the season to ensure that the young plants will start off free from disease when planted in fruiting beds. To make 50 gallons of Bordeaux 5 : 4 : 50 use 5lb. of bluestone (copper sulphate), 4lb. of hydrated lime, and 50 gallons of water. To make 4 gallons use 6½oz. of bluestone, 5¼oz. of hydrated lime, and 4 gallons of water. To make 50 gallons of Bordeaux 3 : 4 : 50 use 3lb. of bluestone, 4lb. of hydrated lime, and 50 gallons of water. To make 4 gallons use 4oz. of bluestone, 5¼oz. of hydrated lime, and 4 gallons of water.

Red core root rot: Investigations have revealed that red core root rot (*Phytophthora fragariae*) of strawberries is due mainly to a parasitic fungus which invades the root tips and grows into the core, which becomes reddened. Roots become infected from autumn to spring, and in late spring and early summer the fungus causes debilitation and gradual dwarfing, wilting, and often death of the plant. The intensity of the disease depends on soil moisture, being most severe when the water content is high.

It has been established that root rot disease was introduced into fruiting beds on runners previously infected in a plant nursery.

Stunted strawberry plants suspected of being infected by root rot fungus should be lifted with the root system intact for inspection. If there is an abundance of small white feeding roots and no rotting of the larger roots, stunting is probably due to some other cause. If the small, fibrous roots are discoloured or are absent, leaving only the rat's tail-like large roots, and if the central part of the large roots is dark red, stunting is due to the red core fungus. The red colour of the central portion of an infected root may extend throughout its length or the colour may show only a short distance above the dead tip. This reddening of the root interior is best demonstrated by splitting the root with a knife or by stripping off the outer portion of the root with the thumbnail. The dark red colour of the central part of affected roots is not known to be associated with any other strawberry disease and the symptom is considered the most reliable one for recognising the disease in the field.

The fungus causing root rot disease is not known to invade the crown or stem, and any discoloration of those tissues should be attributed to some other cause.

Control: As the fungus can remain alive in the soil for several years, strawberry nurseries should not be replanted in soil where infection has occurred previously. Heavy, poorly drained soils should be avoided. Greater care in the selection of runners for planting will reduce the incidence in the field. Runners free from the fungus when planted in soil not previously used for strawberry growing should remain free, but a small percentage of infected plants can spread the infection rapidly where wet conditions prevail. Infected plants should be removed from the nursery beds and destroyed by burning.

The success of the strawberry crop depends largely on the quality of the planting material used. It is essential that preparation and after treatment of the runner bed should be such that the production of vigorous, well-rooted, disease-free plants is encouraged.

References

New Zealand Department of Agriculture Bulletin No. 321, "Strawberry Culture in New Zealand", by J. H. Watt.

United States Department of Agriculture Farmers' Bulletin 1891, "Diseases of Strawberries", by J. B. Demaree.

Humidification System for Propagating Houses

By A. A. POWELL, Storage Specialist, Department of Agriculture, Wellington

THE successful propagation of plant cuttings and grafts, especially the more difficult subjects, in a glasshouse is often dependent on the maintenance of correct relative humidity. A simple method of maintaining relative humidity is described in this article. Similar methods have proved successful overseas.

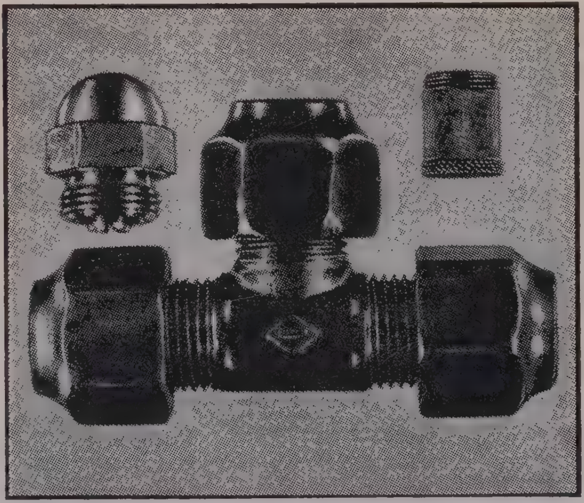
A PRESSURE water supply is usually available in a glasshouse and installation of the necessary fittings to atomise the water sufficiently so that it is readily taken up by the atmosphere is therefore simple. A water pressure of 75 to 100lb. per square inch is required in the main water supply piping. To this water supply is connected ⅝in. copper piping. Galvanised piping could be used, but additional filters or strainers would be required in the pipeline to prevent scale from blocking the nozzles. A filter may be necessary in a copper pipeline also if the water supply is not perfectly clean.

The copper piping may be fitted overhead along the apex of the house and could be slung on wires so that it does not restrict working in the glasshouse. The vaporising nozzles should be spaced alternately along both sides of the piping, and brass tees with flared joints, as shown in the illustration, should be fitted in the pipeline to take the nozzle. The fine gauze filter or strainer fits into the base of each nozzle. For a 20ft. x 15ft. glasshouse 6 nozzles should be sufficient, but actual requirements depend on water pressure, size of nozzle, and size of house. Nozzle sizes available are 1½ gallons and 2 gallons per hour at 100lb. per square inch water pressure.

The best type of nozzle atomises the water into a very fine mist which is readily taken up by the atmosphere until it is fully saturated; that is, has a relative humidity of 100 per cent. The humidity can also be controlled as required, thereby creating ideal propagating conditions for a range of subjects.

Control of Humidity

The automatic control of high relative humidity conditions would be difficult. A clock switch and solenoid valve could be fitted to turn the water on for a few minutes every hour, but this equipment is expensive. A manual control valve or water tap by which the water can be turned on and off at intervals should be all that is necessary for most propagating houses.



Pipeline fittings for a humidification system for a propagating house. Top left—Atomising nozzle. Middle—T-piece with flared joints. Top right—Filter.

From the following approximate costs of materials individual requirements can be readily estimated: Brass tees with flared couplings, 7s. 6d. each; ⅝in. copper piping, 1s. 6d. per foot; nozzles of 1½ to 2 gallons per hour size with filters, £1 each. The cost of materials for a 20ft. x 15ft. glasshouse would be about £10.

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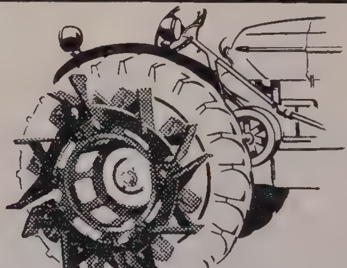

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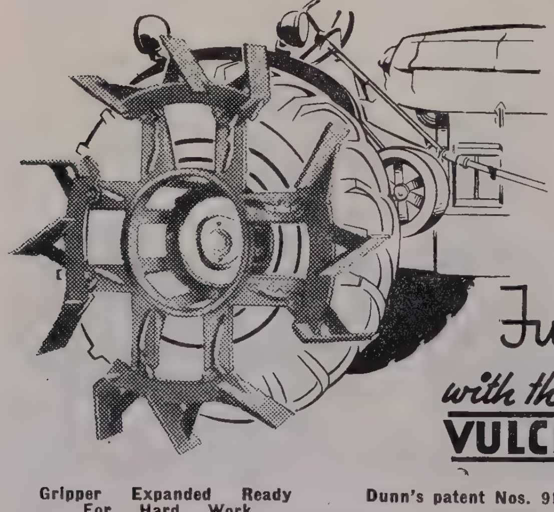

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Two Feeds per Day Enough for Pigs Receiving Separated Milk

FOR some years it has been recommended that pigs receiving separated milk should be fed little and often; but at the Department of Agriculture's Ruakura Animal Research Station it has been shown that two feeds per day are sufficient for pigs fed separated milk. In the following description of an experiment designed to measure the effect of number of feeds per day on growth and feed utilisation D. M. Smith, Research Officer, Ruakura, points out that adoption of the two feeds per day system would save time and labour where feeding had been more frequent and would also be beneficial in allowing greater feeding opportunities to smaller pigs in a litter.

IN the experiment at Ruakura two lots of pigs, each of four groups containing nine pigs per group, were fed a pre-set daily ration in one, two, three, or four feeds.

The ration received by any group was based on the mean liveweight per pig in the group, weights being taken twice weekly. The rations fed are shown in Table 1.

TABLE I—DAILY RATION IN GALLONS ACCORDING TO LIVEWEIGHT

Weight range lb.	Daily ration gallons	Weight range lb.	Daily ration gallons
36-40	1.50	76-80	2.90
41-45	1.75	81-85	3.00
46-50	2.00	86-90	3.10
51-55	2.25	91-95	3.25
56-60	2.40	96-100	3.40
61-65	2.50	101-105	3.50
66-70	2.60	106-110	3.60
71-75	2.75	111-115	3.75

The first four groups were placed on treatment at approximately 40lb. liveweight and were fed for 10 weeks; the second four were started at 35lb. liveweight and the treatment continued for 11 weeks. Four groups comprising one lot were slaughtered at the end of the experiment and carcass measurements taken.

During the last 3 days of the experiment all groups were fed three times per day to equalise gut content at the final weighing.

Results of Experiment

The performance data for the eight groups are shown in Table 2.

It is evident that there is no advantage in feeding pigs more than twice per day. On the other hand there is a slight reduction in both growth-rate and efficiency when the whole of the ration is fed in one feed. Much of this reduction was probably due to the excessive wastage through pigs slopping milk from full troughs on to the floor.

Because in the two feeds per day system there is invariably some milk remaining when immediate appetites are satisfied, smaller pigs within a group can obtain a reasonable share without competing with their larger litter or group mates.

Data relevant to the four groups comprising one complete lot which were slaughtered and the carcass measurements of which were taken are shown in Table 3.

TABLE 3—MEAN BACKFAT MEASUREMENTS, CARCASS PERCENTAGES, AND CARCASS QUALITY APPRAISALS OF GROUPS ON THE FOUR TREATMENTS

No. of feeds	1	2	3	4
Mean backfat (in 1/16in.)				
At shoulder	18.6	19.4	19.3	19.2
At loin	10.9	11.6	11.4	10.8
Carcass percentage ..	73.2	73.9	73.6	73.9
Carcass score (possible 100) ..	74	74	74	74

The lower values shown by the one feed per day group for backfat thickness and carcass percentage are probably due to the lower weight at which these animals were slaughtered. It may be concluded that number of feeds per day did not affect any of the characters listed in Table 3.

TABLE 2—GROWTH RATE AND EFFICIENCY OF FEED CONVERSION OF PIGS FED 1, 2, 3, OR 4 TIMES PER DAY

	Lot A				Lot B			
Feeds per day ..	1	2	3	4	1	2	3	4
No. of pigs ..	9	9	9	9	9	9	9	9
Mean weight at:	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Start	43.4	42.7	44.0	44.1	34.4	34.5	34.2	34.7
Finish	108.0	114.3	115.4	112.7	111.5	114.4	112.8	114.2
Mean gain per pig	64.6	71.6	71.4	68.6	77.1	79.9	78.6	79.5
Mean daily gain ..	0.93	1.02	1.02	0.98	1.0	1.03	1.02	1.03
Gallons per lb. of:								
Liveweight gain	2.8	2.6	2.6	2.7	2.6	2.4	2.5	2.5
Carcass gain ..	3.6	3.3	3.4	3.4				

Important Implications

The fact that two feeds per day are sufficient for pigs fed separated milk at the rate shown in Table 1 has two important practical implications.

First, the time and labour spent in feeding can be reduced where more frequent feeding is practised.

Secondly, on most farms farrowings are spread to the extent that penning of pigs of similar size from several litters is impossible. The result is that each litter usually constitutes a pen, although it contains pigs of various weights. When the rations used in the above experiment were fed in two feeds the pigs never consumed the whole of either feed at once. There was invariably some milk remaining when their immediate appetite was satisfied. Thus, smaller pigs within a group can obtain a reasonable share without competing with their larger litter or group mates.

Newly Weaned Litters

Though no experimental evidence is available, experience at Ruakura suggests that for the first fortnight after weaning litters should be fed more often than twice per day. The problem with newly weaned pigs is to avoid gorging without reducing intake to the extent that growth-rate is slowed. This can be achieved by more frequent feeding. A definite inverse relationship between frequency of feeding and reaction to changes in the condition of the milk fed was observed in the experiment. Soured milk was generally used, but where for some reason fresh milk was included in the ration the pigs receiving the fewer number of feeds were the first to scour and scoured most severely.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during August as follows:—

1YA Auckland, 7.15 p.m.

5 August—"Mole Drainage", by D. F. Scott, Machinery Instructor, Department of Agriculture, Auckland.

12 August—"Troubles of the Calving Cow", by G. V. Wallace, Veterinarian, Department of Agriculture, Auckland.

19 August—"Spring Pasture Management", by H. Woodyear-Smith, Auckland.

26 August—Y.F.C. session, by Kaikohe district committee of Federation of Young Farmers' Clubs.

1XH Hamilton, 12.33 p.m.

6 August—"Johne's Disease in Cattle", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

13 August—"Problems of the Month", by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

20 August—"Hill Country and Meat Production", by A. W. Moore, Federated Farmers, Hamilton.

27 August—"Rush Control with Hormone Weedkillers", by F. B. Thompson, Department of Agriculture Soil Research Station, Rukuhia.

1YZ Rotorua, 7.15 p.m.

6 August—Y.F.C. talk, by Matamata district committee of the Federation of Young Farmers' Clubs.

20 August—"Review of the Incidence of Feed Flavour in Dairy Produce in 1952-53 Season", by G. Purvis, Superintendent of Butter Instruction, Department of Agriculture, Hamilton.

2XP New Plymouth, 8.1 p.m.

6 August—"Waimate West Demonstration Farm", by E. M. Bates, Instructor in Agriculture, Department of Agriculture, Hawera.

13 August—"Hill-country Farming in Central Taranaki", by J. H. Lockhart, Instructor in Agriculture, Department of Agriculture, Stratford.

20 August—Discussion on the various types of buckraked silage stacks on Mr. H. W. E. Phillip's farm, Okato.

27 August—The rearing of poultry on a commercial poultry farm near New Plymouth.

2YZ Napier, 7 p.m.

4 August—"Oversowing on Grass-grub Infested Areas", by F. H. Collin, Fields Instructor, Department of Agriculture, Hastings.

18 August—"Feed Flavours in Milk and Cream", by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

2ZA Palmerston North, 12.33 p.m.

3 August—"Treatment of Lambing Troubles", by E. Nelson, Livestock Instructor, Department of Agriculture, Palmerston North.

10 August—"Preparation for Sowing Brassica Crops", by F. G. Spite, Instructor in Agriculture, Department of Agriculture, Masterton.

17 August—"Running and Maintenance of Cream Separator", by M. J. McFetridge, Special Inspector, Department of Agriculture, Palmerston North.

24 August—"Mole Drainage in the Manawatu", by E. W. S. Wilson, Farm Drainage Officer, Department of Agriculture, Palmerston North.

31 August—"Y.F.C. Session", by I. G. Tabor.

3YA Christchurch

3 August (12.20 p.m.)—Talk, by members of North Canterbury district Committee of Federation of Young Farmers' Clubs.

13 August (7.15 p.m.)—Review of "New Zealand Journal of Agriculture", by E. G. Smith, Fields Instructor, Department of Agriculture, Rangiora.

24 August (12.20 p.m.)—"Diseases of the Feet of Farm Stock", by A. C. Howse, Veterinarian, Department of Agriculture, Christchurch.

4YA Dunedin, 9.15 p.m.

12 August—"Telling Aspects of the Rabbit Pest", by A. R. Murdoch, Livestock Instructor, Department of Agriculture, Kurow.

26 August—"The Home Vegetable Garden", by W. G. Crawford, Horticultural Instructor, Department of Agriculture, Oamaru.

Regular Sessions

1XH Hamilton, Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (Waikato stock review).

1XN Whangarei, Mondays at 8 p.m., Wednesdays at 8 p.m. (Northland stock market report), Fridays at 8 p.m.

1YA Auckland, Mondays at 7 p.m. (Auckland stock market report), Tuesdays at 12.35 p.m., Wednesdays at 7 p.m., Thursdays at 12.33 p.m.

1YD Auckland, Thursdays at 7.30 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock review), fortnightly on Tuesdays at 12.33 p.m. (Federated Farmers' session), Tuesdays at 6.55 p.m. (Frankton stock market report), Thursdays at 12.33 p.m., Thursdays at 7.15 p.m. (farm talks alternating with session for Bay of Plenty farmers), fortnightly on Fridays at 12.33 p.m. (pig council talk).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m.

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawkes Bay orchardist session), Tuesdays at 7 p.m., Wednesdays at 7.15 p.m. (Hawkes Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Tuesdays at 8 p.m., Thursdays at 8 p.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Wednesdays at 7.20 p.m., Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m. and 7.15 p.m., Tuesdays at 7.15 p.m. (Lorneville stock market report), Thursdays at 12.33 p.m.

☆

Book Reviews

"High Country Journey": Peter Newton

THIS third book on his beloved high country by Peter Newton leaves the impression of a much maturer author than was revealed in its predecessors "Wayleggo" and "High Country Days". His enthusiasm for this land apart, the high country of Canterbury between Glen Lyon in the south and Molesworth in the north, is more subdued but nevertheless convincing. Only one with a deep affection for the country and its people would have undertaken such a horseback journey. The result is a valuable contribution to the history of the development of a specialised and important type of farming in New Zealand that the author claims with some reason has not hitherto received the recognition it deserves.

The text is necessarily full of topographical detail, acreages, and carrying capacities, but is attractively interlarded with gossipy narrative of the famous stations and of the men and women who keep them going. Four folding maps enable the author's route to be closely followed and the properties discussed to be located; and though the 34 plates are a liberal measure of illustration, the photography is of such high standard that one wishes for more.

—G.J.N.

A. H. and A. W. Reed, Wellington. 27s. 6d.

"A New Zealand Trout Stream": K. Radway Allen

WHERE the trout come from and where they go to are problems that beset most anglers. Many of them have their own decided views on the answers. This Fisheries Bulletin No. 10A of the Marine Department describes in simple language for the benefit of the angler the results of a scientific experiment to determine how trout streams should be managed to yield the best possible catches. Inquiries for the bulletin should be made to acclimatisation societies.

Government Printer, Wellington.

Publications Received

"Statistical Tables for Biological, Agricultural and Medical Research", Sir R. A. Fisher and F. Yates. Macmillan and Co. Ltd., London. 21s. net.

"Year Book of Agricultural Co-operation 1953". The Horace Plunkett Foundation, Basil Blackwell, Oxford, 21s.

"Symposium on Chromosome Breakage". John Innes Horticultural Institution. Oliver and Boyd, London (Macmillan and Co. Ltd.). 45s.

Courses at Flock House Farm of Instruction

All vacancies in intakes of trainees for courses of instruction during 1954 at the Department of Agriculture's Flock House Farm of Instruction, Bulls, have been filled. A few vacancies for the January 1955 intake remain and a number of applications for entry to courses up to and including January 1959 have been received.

Parents or guardians intending to apply for the admission of boys to Flock House are advised to make early application. A prospectus, containing an application form, can be obtained from the Department's local Extension Division officer.

Rearing Dairy Calves

By A. G. BRASH, Veterinarian, Department of Agriculture, Christchurch

IN judging the efficiency of any method of calf rearing two factors must be taken into account. Its influence on calf wastage due to deaths, particularly during the first year, and its effect on subsequent production, breeding efficiency, and general health of the heifer or mature cow. The economic aspects of calf rearing are of course important, but they must be considered in conjunction with the above factors. The ideal is to rear the calf at the minimum cost consistent with its healthy growth and development to productive life. Failure to reach this minimum is not the only or even the main cause of poorly reared calves. Lack of appreciation of the points of good calf husbandry may lead to results far below those which could be expected from the amount being spent on milk or other calf feeds.

THE potential maximum production of the cow is determined by the qualities inherited by the calf. The actual production is influenced by the way the calf is reared. Experiments have shown a difference of at least 20lb. in the butterfat production of well-grown and poorly grown heifers, and this difference can persist to quite a marked degree in subsequent lactations.

Wastage due to death of calves between the ages of 1 week and 1 year is about 6 per cent. Much of this is due to calf scours, which is often nutritional in origin. The digestive system of the calf in common with that of other young animals is easily upset and failure to appreciate this is the cause of much of the trouble experienced in rearing calves. The young calf's stomach is comparatively small and is designed to deal with only small quantities of milk taken at frequent intervals. To make the desired progress, compared with a calf reared on the cow, the bucket-fed calf would have to take in two feeds daily more than its stomach would be capable of handling.

Cow's milk is formed into a relatively dense curd by the rennet in the stomach of the calf. It is gradually digested, but if any curd remains in the stomach at the next feed of milk, it forms a core for the formation of a larger, denser curd. Eventually the calf suffers from severe indigestion and scours.

Over-feeding must therefore be avoided, especially in the first few weeks. There is no doubt that it is frequently the primary cause of calf scours.

First Week Important

Whether the newly born calf is allowed to remain with its mother for some time or is removed after a few hours is not of vital importance, provided it is left long enough to obtain a good drink of the mother's milk. The longer the calf is allowed to remain with the cow the greater the disturbance when it is taken away. Perhaps the best practice is to remove the calf within 12 hours. The young calf must be taught to drink from the bucket and the simplest way of doing this is to leave it without milk for from 12 to 24 hours and then allow it to suck the fingers, which have been immersed in a little milk. Not more than a quart of milk should be fed at the first feed.

The mother's milk or colostrum, as milk from a newly calved cow is called, should be fed for at least the first few days. The colostrum is laxative and provides the calf with vitamin A and the antibodies against certain bacteria which cause diseases of the calf. The vitamin A content of colostrum is from 10 to 100 times that of ordinary milk and has a bearing on the protective mechanism against infectious disease. If for any reason the colostrum is not available, a dose of ½oz. (1 tablespoon) of castor oil and ½oz. of cod liver oil should be given. Doses of cod liver oil should be continued for 3 or 4 days.

Amount to Feed Daily

A fundamental principle is that calves must be treated as individuals and fed according to their size and strength. An amount of milk that may be tolerated well by one calf may cause nutritional scours in another.

The rate at which calves drink also varies so much that the trough system of feeding, which is still too widely used, can never be satisfactory.

About 10 per cent. of the calf's body-weight is the right amount to feed daily, but this rate should not be reached until toward the end of the first week. Average birth weights of calves of the commoner breeds are Jerseys 55lb., Guernseys 65lb., Ayrshires 70lb., Shorthorns 75lb., and Friesians 85lb. One pint of milk weighs 1¼lb. A 70lb. calf should receive not more than 5 to 6 pints of milk daily

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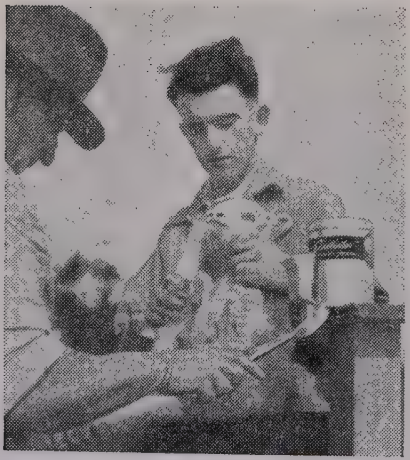

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during the first week. A gradual increase should be made so that at 3 weeks the calf is receiving about 1 gallon per day.

Feeding Methods

The usual practice is to feed warm milk, but this is not essential and many farmers claim excellent results from feeding milk which is almost cold. It is possible that the calf may benefit from the extra time taken to consume cold milk. However, milk should not be fed when it is too cold and a consistent practice should be adopted.

Feeding twice a day is found to be satisfactory if supervised carefully, especially when the calf receives the milk from its mother or from recently calved cows. Any advantages of more frequent feeding are outweighed by practical difficulties.

The stage of lactation of the cow from which milk is saved for calf feeding is important. The curd formed from the milk of cows which have been milking for some time is denser and more indigestible than that from the milk of recently calved cows and may cause scours. Farmers should endeavour to feed milk from cows in early lactation. When most of the cows calve about the same time feeding of the mixed milk of the herd presents no problem for early calves. For late calves or in town supply herds, however, mixed milk may be unsuitable for young calves. If it is not possible to avoid feeding some milk from cows which are not recently calved, 25 per cent. of water should be added as recommended for rich milk. For convenience in feeding calves it may be necessary to include some colostrum in milk fed to older calves, but it will not be harmful.

Calf scours is more likely to occur when the milk is too rich. The practice of adding water to milk with a high butterfat content before it is fed to calves is strongly recommended. It results in a softer and more easily digested curd in the stomach.

Approximately 1 pint of water can be added to every gallon of milk for each 0.5 per cent. in excess of 3.5 per cent. of butterfat. Thus 2 pints of water per gallon would be added to milk with a 4.5 per cent. test.

The longer the calf is allowed to remain with the cow the greater will be the disturbance when it is taken away. It is perhaps best to remove the calf within 12 hours, but it should be left long enough to have a good drink of its mother's milk.

Changing from Whole to Skimmed Milk

The length of time whole milk is fed will depend on the strength of the calf and the quality of the whole milk substitute and pasture available. It is false economy to discontinue feeding whole milk too soon, and it is wasteful to continue it beyond the time when a satisfactory growth-rate can be maintained by cheaper feed. For strong, vigorous calves the feeding of whole milk is necessary for the first fortnight, but weak calves should be fed whole milk only for at least 3 weeks. Whatever method of feeding is adopted the change from whole milk to skimmed milk or other substitute should occupy at least a week, preferably up to 3 weeks.

Rearing on Skimmed Milk

The only appreciable difference between whole milk and skimmed milk is in the fat content, which in skimmed milk is only about 0.1 per cent. The deficiency must be made up either by providing good pasture or by using cereal meals. It is not necessary to supply both, and provided there is an adequate intake of good pasture as outlined in the section dealing with grazing, there is no advantage in feeding calf meals with skimmed milk. The feeding of vitamin or mineral supplements is usually not necessary under

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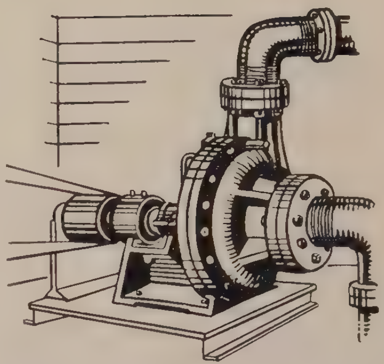

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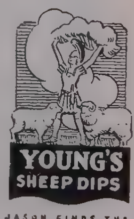

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Where an adequate system of controlled grazing is not practised calves should if possible be weaned on to a paddock of saved young grass.

New Zealand conditions of calf rearing. Where early grazing is not provided meals should be fed and there are a variety which can be used successfully. Meal mixtures may contain varying proportions of barley meal, linseed, pollard, maize meal, pea meal, and meat meal. The meal is best given dry after the milk is fed.

The individual system of feeding should be continued with skimmed milk, of which not more than 1½ gallons is needed daily. Overfeeding with skimmed milk may cause stomach derangement, unthriftiness, and a pot-bellied condition.

As it is not long before the full water requirements of the calf are not met by the daily intake of milk, a good supply of clean water should always be provided.

Early Grazing Desirable

By the end of the third week rumination has usually begun and grazing can play an increasingly important part in the nourishment of the calf. The earlier calves can be allowed out to graze the better, provided such grazing is on fresh, short, leafy pasture. Even in the first 2 or 3 weeks a rotational system can often be adopted by the subdivision of a spelled calf paddock handy to the shed. The area used for this need not be large. The rotational grazing of young calves ahead of the dairy herd while they are still being fed on milk involves some extra labour, but many may consider that the results obtained justify the effort.

There is a widespread lack of appreciation of what is suitable grazing for calves. Calves are very selective grazers. If they are set stocked even in a field carrying plenty of feed, they slowly starve themselves, because they will eat only the closely grazed patches. Fortunately the type of pasture management which provides the calf with the maximum of digestible young grass at the same time gives the greatest degree of control over calf diseases and parasites. When calves are shifted every one or two days the level of food intake is higher and worms are kept under control.

Rearing without Skimmed Milk

The total amount of whole milk needed to rear a calf when skimmed milk is available is usually about 30 gallons, although it may be less than this if the change to skimmed milk is started at 2 weeks. Whether this amount will need to be increased in the absence of skimmed milk by feeding whole milk over a longer period will depend on the substitute used. A fluid of approximately the same value as skimmed milk can be made by mixing 1lb. of dried skimmed milk or buttermilk in a small quantity of water and then making it up to 1 gallon with warm water. This can be substituted for whole milk in the same quantities and at the same age as for skimmed milk, but the cost is relatively high. Pure buttermilk also has the same feeding value as skimmed milk, but the factory product may contain varying amounts of added water. The proprietary calf foods available as milk substitutes should be fed strictly according to the makers' instructions.

Alternatives are to increase the total quantity of whole milk fed to about 40 gallons and feed calf meal from the end of the third week as in schedule B (see below), or to use from 50 to 60 gallons of whole milk only as in schedule C and wean at an early age. Successful weaning at 8 weeks or even earlier is possible. This has been shown by experiments at the Department of Agriculture's Animal Research Station, Ruakura. Early weaning should be attempted only under the following conditions:—

1. Feed 50 to 60 gallons of whole milk per calf for the first 8 weeks.
2. If a calf is below average size for its age, continue feeding of whole milk for an extra 2 weeks; that is, wean at 10 weeks.
3. If calves are being reared on whole milk and skimmed milk, wean them at 8 weeks; if they are undersized, wean at 10 weeks.
4. Practise early weaning only in association with rotational grazing of good-quality dairy pastures.

Rearing on Whey

Whey is deficient in both fat and protein. It is very dilute and has about half the feeding value of skimmed milk. Whole milk only should be fed for the first 4 weeks. Because of its high protein content, meat meal is a suitable supplement to feed with whey. However, it is unpalatable to calves and it will give better results if mixed with a cereal meal such as barley meal in the proportion of 1 part of meat meal to 2 parts of cereal. It may be fed as indicated in schedule D. Greater care must be taken in changing from whole milk to whey, than to skimmed milk, as a sudden change will cause scours. Calves can be reared successfully on whey, but it is more than ever necessary to provide clean, fresh pasture and good, leafy hay.

Whey paste is a by-product of milk sugar manufacture which is available in some districts. One pound mixed with a gallon of warm water has a feeding value almost equal to that of skimmed milk except that it is not as rich in protein. It should be fed with a little whole milk supplemented with meat meal or cereal meals.

Calf-feeding Schedules

It is not possible to draw up feeding schedules to suit all calves under varying conditions. Those given below must be taken only as a general guide and altered to suit the circumstances.

		A		B		C	D		
Live-weight lb.	Age weeks	Whole milk pints per day	Skimmed milk pints per day	Whole milk pints per day	Meal oz. per day	Whole milk pints per day	Whole milk pints per day	Whey pints per day	Meal oz. per day
70	0-1	6		6		6	6		
80	1-2	7		7		7	7		
90	2-3	8		8		8	8		
100	3-4	6	3	7	4	9	9		
No data available	4-5	5	5	6	4	10	8	4	2
	5-6	4	7	5	8	11	7	6	4
	6-7		12	4	8	8	6	8	6
	7-8		13	3	16	4		12	8
	8-9		14	2	16	wean		14	12
	9-10		15		24			16	14
	10-14		16		32			20	16
	14-16		8		16			16	12
	16-18		4		8			12	8
	18		wean		wean			wean	wean

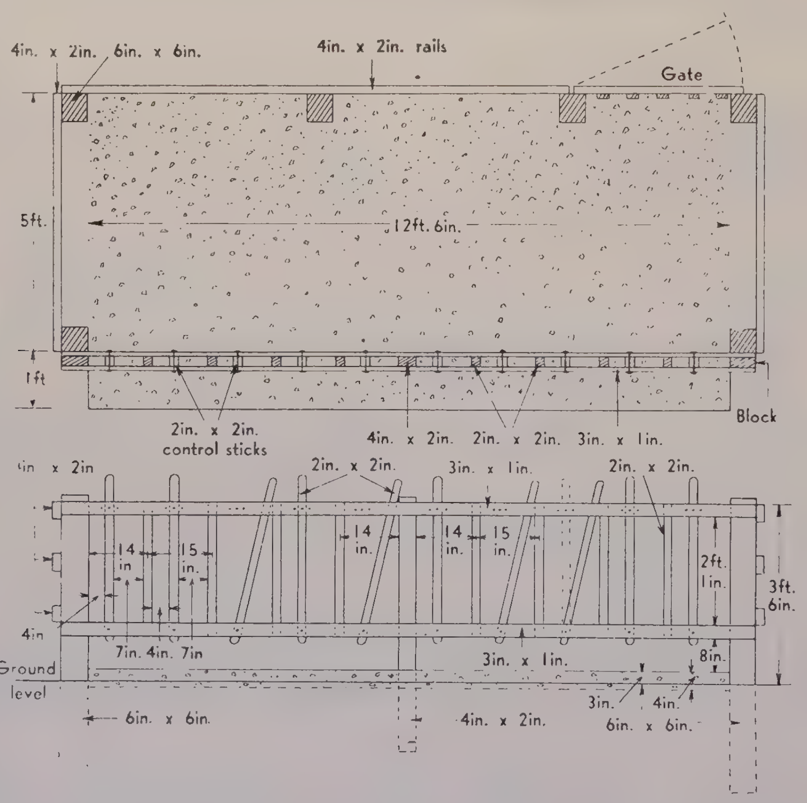
Weaning

Calves are usually weaned from skimmed milk or whey when about 4 months old. They can be weaned at as early as 8 weeks provided they are well grown and rotationally grazed on good pasture. The age of weaning must always be considered together with the progress the calf has made and the quality of grazing available. When calves are on good feed and have been trained to eat a little hay the setback at weaning need not be great. Feed hay once a day for a few days and see that the calves have a supply of clean drinking water.

In the post-weaning period the emphasis must still be on the quality of feed, as the calf may suffer from insidious starvation on feed which will maintain good condition in adult cattle. This applies particularly to the type of feed calves will get under set stocking and to poor hay. Where an adequate system of controlled grazing is not practised calves should if possible be weaned on to a paddock of saved young grass. Young animals need good, early-cut hay, particularly lucerne or clover hay in which the leaf is still conserved. As semi-drought conditions are not uncommon during February and March in some districts, supplementary feeding may be necessary, and if hay is used, calves should be accustomed to it while still on the bucket. If hay is not good, an allowance of silage will serve to balance requirements. Gradual introduction should be made with any other hand-fed ration.

Worms are a frequent cause of loss after weaning and worm trouble will be at a minimum under a controlled system of grazing when calves are shifted every one or two days ahead of the cows. Experience at Ruakura has shown that under this system drenching can usually be dispensed with. Under other conditions it may be necessary to treat calves every 3 weeks after weaning. Spelling pastures for as little as 3 weeks will materially assist in reducing the worm population.

Plan and Elevation of Calf-feeding Bails



DIMENSIONS

Yard: 6ft. x 12ft. 6in., concreted, including 1ft. in front of the bails, 4in. thick. Bails in front for 10 calves. Fenced on three sides with three 4in. x 2in. rails to a height of 3ft. 6in. above ground level or 3ft. 3in. above the concrete. Access by gate at back. Bails: Top and bottom made with double lengths of 3in. x 1in. timber, 2in. apart to take control sticks and supports, which are of 2in. x 2in. hardwood fencing battens. Width per calf about 15in.

MATERIALS

Bails: 4 pieces of timber 13ft. 6in. x 3in. x 1in.; 1 post 4in. x 2in.; 8 battens 2ft. 7in. x 2in. x 2in.; 10 battens 3ft. 3in. x 2in. x 2in. for control sticks; 4 blocks 6in. x 3in. x 2in.; 10 $\frac{3}{8}$in. bolts and nuts for bottoms of control sticks; 10 $\frac{3}{8}$in. bolts to peg control sticks. Yard: 6 posts 5ft. 6in. x 6in. x 6in.; 6 pieces 5ft. x 4in. x 2in. for sides; 3 pieces 9ft. x 4in. x 2in. for back. Gate: 12ft. of 4in. x 2in. and 12ft. of 4in. x 1$\frac{1}{2}$in. timber. Concrete: About 20 cub. ft.

Calf Bails and Houses

Individual feeding of calves is necessary to ensure that each calf receives its proper share of milk or supplement and the only practical method is by use of calf bails. The use of bails educates the young animals for the milking shed, and more important, calves can be held for several minutes after feeding and so prevented from sucking each other.

Combined feeding bails and houses can be built to elaborate plans, but such layouts are seldom necessary. Calves will benefit from being put out to graze as soon as possible away from pens and calf paddocks, which may carry infection. However, it is imperative to give young calves protection from cold winds and bad weather, and for this purpose a simple, open-fronted shed for shelter may be provided apart from the bail structure. However elaborate the building may be it is most essential that to maintain freedom from digestive disorders and infectious diseases yards and sheds should be kept clean and tidy.

The shed should face north to admit sunlight and have the front closed with half doors only. Close conditions leading to a stuffy atmosphere in the calf house are not conducive to good health. The shed should have sufficient subdivision to enable very young calves to be kept separate. A shed 12ft. 6in. by 9ft. would accommodate 12 calves; the height need not be more than 6ft. 6in. in front. The floor should be of concrete or other suitable material to allow thorough cleaning and drainage. A design for a simple set of feeding bails with concrete yard for 10 calves is shown on this page and it can be modified or extended to suit requirements.

Diseases of Calves

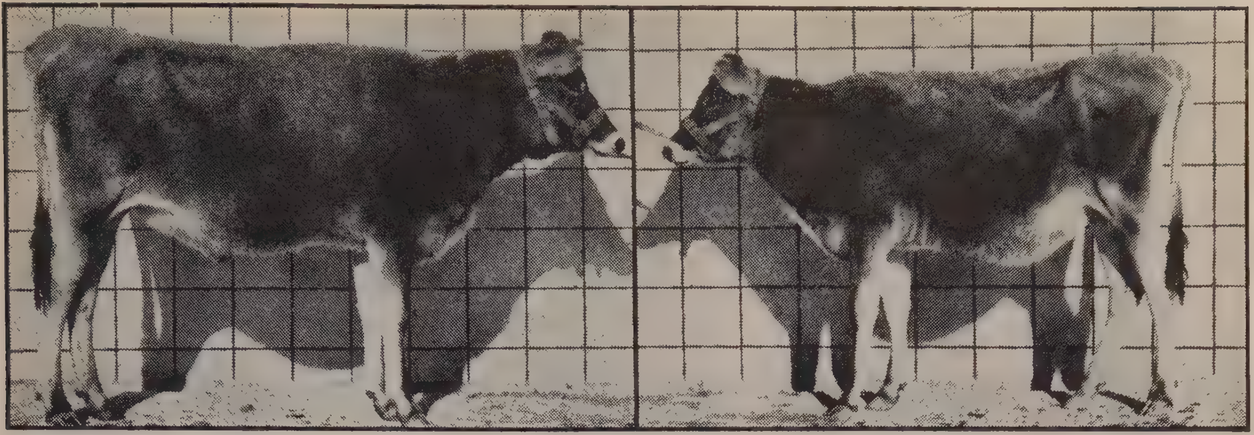
Calf Scours

Calf scours is the most frequent cause of calf losses and is responsible for about half the deaths in the first month and one-third of those in the first year. For convenience the condition can be divided into three main types according to the primary cause:—

1. Nutritional scours.
2. Infectious scours.
3. Scours due to worm parasites.

The first two types occur mainly in the first 3 months of the calf's life. Worms as a cause of scours are important only in older calves. In some districts scours in older calves may also be caused by copper deficiency. No hard and fast division can be made between nutritional and infectious scours except in the primary cause. Many cases of calf scours begin with faulty feeding, and the development of bowel infection is secondary.

Nutritional scours: All young animals have a delicate digestive system, any disturbance of which is usually followed by diarrhoea or scours. As the calf is removed from its mother very early in life and artificially fed, it is not surprising that it is one of the most susceptible of all



Worms are a frequent cause of loss after weaning, but the trouble can be minimised under a system of controlled grazing when calves are shifted every one or two days ahead of the cows. These identical twins at the Department of Agriculture's Animal Research Station, Ruakura, show at left one rotationally grazed and at right the other set stocked.

young animals on the farm to digestive upsets and bowel infection.

Over-feeding is the commonest cause of nutritional scours in young calves. It is better to allow calves to develop more slowly than to risk increasing the amount of milk beyond their capacity to digest it in two feeds daily. The risk of indigestion is also increased if the milk is too rich.

Strict rationing of milk or milk substitute and the dilution with water of whole milk with a fat content of over 3.5 per cent. are therefore the two most important factors in the prevention of dietetic scours.

Also of importance is the maintenance of clean, tidy surroundings to prevent calves developing indigestion caused by chewing straw, bits of string or wood, or other foreign objects.

Three pints of whole milk fed twice daily may seem a small amount to give a Jersey calf in the first week or 10 days, but this amount must not be exceeded where there is trouble with scours at this stage. The need to feed colostrum followed as far as possible by the milk of recently calved cows has already been emphasised. Special care is needed with calves which have been bought for rearing and transported to new quarters. It is then wise at the first feed to allow only 3 to 4 pints of water to which sugar or glucose may be added and at the second feed 2 to 3 pints of milk diluted with an equal quantity of water.

Nutritional scours will often respond to simple treatment in the early stages. The first essential is to remove as much as possible of the undigested material and allow the stomach time to recover. A dose of castor oil as recommended in the summary of treatment should be given. Milk should be withheld for 24 hours, only boiled water being given during that period; the calf should be fed only a restricted quantity of milk diluted with equal parts of water, the strength being increased gradually as recovery takes place. More-persistent cases may need treatment with sulphonamide or other drugs which are effective against the secondary infection.

Infectious scours: If it is clear that the feeding is not at fault, infection may be the primary cause of trouble. There are two main types of infections causing calf scours—bacterial infections and coccidiosis, which is due to a protozoan parasite. Coccidiosis is a frequent cause of scours, especially in calves 3 weeks to 3 months old. Scours are sometimes described from the nature of the faeces passed. Thus in white scours there is a whitish, creamy, or yellow diarrhoea, and this type is most common in the first fortnight. Blood scours, in which the faeces may contain clots of fresh blood and also mucus, is an indication of an acute and severe infection which has caused bleeding from the wall of the bowel. It is particularly common in coccidiosis. In certain stages of their development the coccidia penetrate the wall of the intestine and cause severe damage. Severe infections of both types may cause death in from 2 to 7 days or calves may reach a more chronic stage which is associated with loss of condition and general unthriftiness.

Preventive measures must include a thorough clean up and disinfection of infected premises and feeding utensils and the isolation of infected calves. If calves are confined to small paddocks, arrangements should if possible be made to give them greater scope on clean pastures with frequent shifting.

Treatment for bacterial infections or coccidiosis should be the same as recommended for nutritional scours with the additional use of sulphonamide or other drugs as prescribed by a veterinarian. Diagnosis of coccidiosis is made by examination of faecal samples.

Scours due to worm parasites: Worms are not usually a cause of serious trouble until after weaning. They are particularly likely to cause losses in the first autumn and winter. The symptoms apart from scouring (which is usually present) are unthriftiness, gradual loss of condition, and anaemia.

Preventive measures and treatment are the same for all the usual types of stomach and intestinal worms. Under favourable conditions the worm eggs hatch out within 24 hours, but the larvae do not reach an infective stage for 5 or 6 days. Some may persist on the pastures for many months, but most die within 3 weeks after reaching the infective stage, so that spelling paddocks for even a short time helps to reduce the worm population. Therefore the system of grazing management has a most important bearing on worm infestation. The worm population on the pasture is reduced by an adequate system of controlled grazing. At the same time the extra thriftiness of the calves under these conditions increases their resistance to infestation and may make drenching unnecessary. About 14 separate paddocks are needed for best results and to allow shifting of the calves every one or two days ahead of the cows.

Under less favourable conditions drenching should begin at weaning time and if necessary be repeated every 3 weeks. Particular care is needed when a mass hatching of worm eggs is caused by rain after a dry period in autumn. Calves should be drenched 3 weeks after the wet period began.

Probably the most effective worm medicine is phenothiazine. In a few instances calves after drenching with phenothiazine have developed an inflammatory condition of the eyes when exposed to sunlight, but these cases occur too seldom to be viewed seriously. Any ill effect may be avoided if calves are kept under observation on the day after drenching and at any sign of weeping are put into a shed out of the light for the remainder of that day. Any risk should then be past.

The bluestone-nicotine sulphate mixture or bluestone alone is also a useful worm drench and may be more effective than phenothiazine against certain types of worms. Both may be used alternatively with phenothiazine.

Summary of Prevention and Treatment of Calf Scours

1. Feed colostrum for the first few days and then milk from recently calved cows.

2. Avoid over-feeding, especially in the first fortnight.

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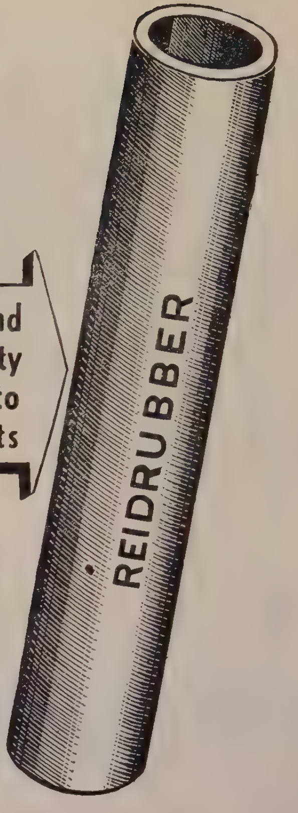

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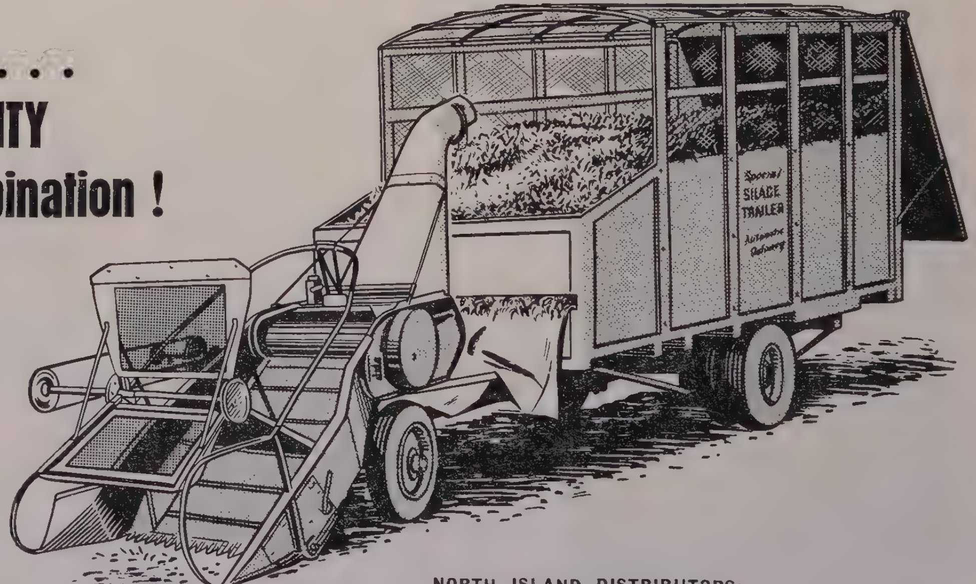

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3. Feed according to the size and strength of the calf and in individual buckets.

4. Keep feeding utensils clean and surroundings clean and tidy.

5. Add water to the milk at the rate of 1 pint per gallon for each 0.5 per cent. in excess of 3.5 per cent. of butterfat.

6. Feed twice daily at regular intervals.

7. Make changes gradually.

8. Put calves under a rotational grazing system as soon as practicable.

9. If young calves develop scours, treat them with castor oil (dose, 1oz. the first week, 1½oz. the second week, and 2oz. the third week). Allow only water for the next 24 hours, then half milk and half water until recovery is complete. Treat infectious scours due to bacteria or coccidiosis with sulphonamide drugs, particularly sulphamezathine, as prescribed by a veterinarian.

10. Increase resistance of older calves to worms by adequate feeding after weaning and rotational grazing.

11. Treat calves for worms with phenothiazine or bluestone-nicotine sulphate mixture every 3 weeks after weaning when necessary.

Lungworm

Lungworm is not common in New Zealand and probably occurs most often in calves under 6 months old. It is much less widely distributed than stomach and intestinal parasites. The free larval forms are less resistant to dry conditions. The symptoms are periodic attacks of severe and distressing coughing, which weaken the calf and interfere with feeding and rest. On post-mortem examination the cotton-thread-like worms are easily seen in the smaller branches of the windpipe, and areas of the lung may be solid.

The life cycle of the lungworm is similar to that of stomach and intestinal worms, and the system of management recommended to reduce the incidence of these will also prevent lungworm. The treatment for stomach and intestinal worms will also increase resistance against lungworm, as will good nutrition. Medicinal treatments aimed at killing lungworms are generally not effective.

Redwater

Redwater may be responsible for fairly sudden deaths of calves, usually animals under 6 months old. It may occur in young calves still on milk alone, but more frequently calves 1 to 3 months old are affected. Redwater in calves has now been identified as an infectious disease caused by an organism known as *Leptospira pomona* and the disease is known as leptospirosis. The condition starts as a fever, the calf showing depression and rapid breathing, and going off its feed suddenly. The urine becomes dark red and this may be the first symptom noticed. Affected calves develop anaemia and jaundice as indicated by a pale or yellow discoloration of the lining of the eyelids. The onset is sudden and the death-rate is high. Death may occur a few hours up to several days after symptoms are first noticed. Calves which recover may show continued unthriftiness over a long period. The infective organisms are passed in the urine, and if calves are not treated, they may be present for several months in the urine of calves which recover. These carriers are a source of infection to other calves.

In an outbreak it is important to notice the early symptoms—fever, depression, and loss of appetite—and give treatment before there is any change in the urine. The change of the urine to dark red usually develops in from 24 to 48 hours after the rise in temperature. Treatment in the later stages is much less effective. The normal temperature is about 101 to 102 degrees F. In affected calves the temperature rises to 104 to 107 degrees. In an outbreak it is simple to take the temperature of each calf by inserting a clinical thermometer in the rectum. Treatment should be given at the first sign of a rise in temperature. Treatment with the antibiotic drugs such as penicillin, streptomycin, and aureomycin is effective at this stage. The treatment may be applied by the farmer, but first must be prescribed by a veterinarian.

Redwater should be treated as a contagious disease and affected calves isolated. If it occurs in young calves, pens and feeding utensils should be disinfected. Calf buckets may be disinfected in the manner usually employed for dairy utensils, that is, by washing first in warm water, then in boiling water plus caustic soda (1 teaspoon to 4 gallons of water), and finally dipping in boiling water. Older calves should be removed to clean pasture. Pigs may be carriers of the leptospira germ. They should never be allowed to associate with calves nor should there be any drainage from pig premises into calf paddocks.

Leptospirosis is transmissible to human beings and in outbreaks of redwater in calves care should be taken to avoid infection. The symptoms in humans are similar to influenza, there being sudden onset of malaise, fever, and severe headaches and muscular pains. Occasionally slight jaundice and very dark urine are observed. These symptoms may persist for several days and should be reported to a doctor. Washing the hands immediately after handling infected calves will remove the risk of infection. As the germ is present in

[*News-photo*

Semi-drought conditions are not uncommon during February and March in some districts and supplementary feeding may be necessary. If hay is used, calves should be accustomed to it while they are still on the bucket.

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the bloodstream of calves in the early stages, farmers should not skin, or conduct post-mortem examinations on, calves which die of redwater. Carcasses should be buried or burnt. Apart from infection by mouth germs may penetrate through cuts in the hands, and there is evidence that they may even penetrate unbroken skin.

Calf Pneumonia

Cattle of all ages may be affected with pneumonia, but calves between the ages of 3 weeks and 4 months are particularly susceptible. Usually the organisms which are responsible normally inhabit the respiratory tract. There are three main predisposing causes:—

1. **Exposure to cold:** This is probably the commonest cause. Calves are sometimes tethered in a cold paddock, between buildings, or under trees where they are exposed to cold draughts with no provision for shelter. As a result their resistance to disease is lowered.
2. **Overcrowding and bad hygiene:** These are important factors where calves are housed or kept in pens.
3. **Pneumonia frequently occurs in association with calf scours:** It is then usually a secondary complication.

A calf affected with pneumonia is first noticed to be depressed and off its feed, breathing rather rapidly, and having a thick mucous discharge from the nostrils. The temperature is raised and a cough soon develops. Calves which recover may remain stunted and unthrifty. The death-rate from pneumonia is higher in younger calves.

Affected calves should be isolated and placed in a warm, dry shed free from draughts but with adequate ventilation. If calves are treated in the early stages, good results can be obtained. One of the most efficient drugs is sulphamezathine, for which a veterinary prescription is needed.

Calf Diphtheria

Calf diphtheria, which has no connection with the human disease, is not common in New Zealand. It is caused by an infection of the mouth and throat by a specific organism called *Fusiformis necrophorus*. It is more likely to occur under dirty conditions, especially if calves are housed in closed sheds without adequate sunlight or ventilation. It may affect calves from a few days old up to 4 months, but very rarely older calves.

Usually the first sign is some dribbling from the mouth and the calf's refusal of food. Swallowing movements may be noticed and sometimes there is a swelling of the cheek or throat. During examination of the mouth an offensive smell can be noticed. Greyish yellow necrotic ulcers are present, either inside the cheek, on the tongue, or occasionally further back in the throat. Young calves may die in from 3 to 5 days; older calves may survive several weeks and eventually die of pneumonia. Mild cases sometimes recover spontaneously. Affected calves should be isolated. The ulcers may be swabbed with Lugol's iodine solution, but the most effective treatment is the administration of one of the sulphonamide drugs.

Blackleg

So far blackleg in calves is confined to Taranaki and Auckland Provinces. The causal germ is present in the soil. Calves may be seen lame, but more often are found dead. Just after death there may be a definite gas-distended swelling of muscle tissue of the hindquarter or shoulder region, though general swelling up of the body occurs fairly soon. Preventive vaccination is carried out in infected areas.

Vaccination of all calves is strongly recommended even when there is no contagious abortion in the herd. Infection of a herd where there has been no vaccination will result in heavy losses in the first year.

Ringworm

Ringworm is very common in calves. It frequently disappears spontaneously in 3 or 4 months, but it may become serious, especially if the calves are undernourished. The most common sites of infection are the face, eyelids, head, and neck. Sometimes it occurs on the body, but rarely on the legs. The lesions are circular, flat, scaly elevations which vary in size and may eventually run together over a large area. It is caused by fungi of various species. As it can be communicated to human beings, hands should be thoroughly washed after affected calves have been handled.

There are many effective treatments, but one of the best is to scrub in tincture of iodine thoroughly twice daily. If infection is more extensive, a 5 per cent. solution of bluestone may be scrubbed into the patches.

Lice

Calves are frequently affected with lice of either the biting or sucking type. Both types are permanent parasites living continuously in all their stages on cattle and are not able to survive for more than a few days if removed from their hosts. The lice of other farm animals or poultry do not infest calves. Lice infestation varies with the seasons, being worst during winter and early spring. Infested calves show intense itch and there is constant rubbing and scratching. In the search for lice on lightly affected animals particular attention should be paid to the head, along the back and base of the tail, and inside the thigh. The infestation is influenced by the condition of the calf and although lice may be found on animals in good condition, they tend to be worse on unthrifty calves.

Insecticides containing benzene hexachloride (B.H.C.) are the most suitable for controlling lice in calves, as they are non-poisonous and effective. Dipping is the best method of application, but spraying or dusting with the powder form is satisfactory if done thoroughly. The residual effect of B.H.C. is usually sufficient to kill any lice which hatch out after treatment and a second treatment a fortnight later may not be necessary.

Tuberculosis

Contrary to what is often believed, calves are very rarely born with tuberculosis, nor is there any hereditary tendency toward the disease. They are, however, very susceptible to infection from the milk of infected cows or by grazing with infected adult cattle. Even one advanced case of tuberculosis in a herd is sufficient to lead to rapid spread of the disease to young stock. Calves should never be fed milk from cows about which there is any suspicion of tuberculosis and all such suspicious cases should be reported immediately.

Vaccination against Contagious Abortion

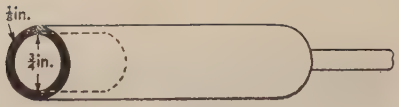
Calves are vaccinated against contagious abortion after the age of 4 months. If vaccinated earlier, they may not develop satisfactory immunity. They may be vaccinated at any age after 4 months provided they are not in calf at the time. The vaccination of all calves is strongly recommended even when there is no contagious abortion in the herd, as the introduction of infection into a herd where no vaccination has been done will result in heavy losses during the first year. Still more satisfactory reduction in the incidence of contagious abortion could be made if all owners of calves would have them vaccinated.

Lead Poisoning

The usual cause of lead poisoning of calves, which is fairly common, is the licking and swallowing of lead paint. Although freshly painted objects and discarded paint tins are the obvious sources, poisoning frequently results from calves chewing objects on which the paint is old and obscured by dirt or whitewash. The source of lead can easily be overlooked. In many cases where analysis has proved the existence of lead poisoning prolonged search has been necessary to discover the origin of the poison. Other possible sources of lead are old car batteries, orchards which have recently been sprayed with lead arsenate, arsenical weedkillers, foot-rot baths, or dips.

Calves suffering from lead poisoning generally die quickly, but excitement, staggering, grinding of the teeth, and salivation are symptoms which may be noticed. There is abdominal pain and blindness and frequently severe constipation. Diagnosis can be confirmed only by laboratory analysis. For this purpose 1lb. of liver and 1lb. of fourth-stomach contents, both specimens unpreserved, are required.

The most effective antidote is Epsom-salt, 2 to 4oz. in water, followed by a pint of medicinal paraffin. The calf may be allowed a liberal diet of milk.



Head of debudding iron.

Copper Deficiency

Copper deficiency may be the cause of scours and unthriftiness in some areas. New Zealand has not been surveyed completely for copper deficiency, but it occurs particularly on reclaimed swamps or peaty soils, on some pumice soils, and on peat and pumice mixtures. Scouring has been reported in calves shortly after they begin to eat grass, but it is at its worst during the winter and spring when the animals reach yearling stage.

Calves on copper-deficient country do not thrive or fill out and are more liable to parasitic and other infections. Usually a diagnosis may be made from the symptoms already described and from the fact that dosing calves with a bluestone (copper sulphate) solution results in improvement. Calves should be given 1 pint of the solution (made by dissolving 1oz. of bluestone in 1 gallon of water) at 2-day intervals for 10 days.

Veterinarians or Livestock Instructors of the Department of Agriculture should also be consulted so that arrangements can be made for pasture analysis and blood or liver assessments.

Other methods of countering copper deficiency are to add bluestone to stock drinking water, by supplying bluestone licks, or by topdressing with bluestone or copperised superphosphate.

Cobalt Deficiency

Loss of appetite, depraved appetite, progressive loss of condition, and sometimes scouring are symptoms of cobalt deficiency. Anaemia may appear at a later stage. Cattle are less susceptible than sheep and if weaned lambs thrive on a property, the cause of unthriftiness in calves on the same property will not be cobalt deficiency. Unweaned calves are sometimes affected, but the condition seldom appears in its acute form until after weaning.

Cobalt deficiency may be diagnosed by dosing calves with 5 fl. oz. of a dilute cobalt sulphate solution twice weekly for 5 weeks, when they should show marked improvement if cobalt deficiency has been the trouble. The procedure for making the solution is as follows: Make a concentrated solution by dissolving 1oz. of cobalt sulphate in 1 pint of water; add 1 fl. oz. of the concentrated solution to 1 gallon of water. This solution is used for drenching as already described.

Veterinarians or Livestock Instructors of the Department of Agriculture should be consulted so that arrangements can be made for diagnosis by other methods and advice received about topdressing with cobaltised fertiliser or the use of cobaltised licks.

Dehorning

Horns add nothing to the value of cattle for the purposes for which they are kept on New Zealand farms; on the other hand, they cause damage and indirectly are responsible for loss of production in milking herds. The disbudding of young calves by any of the recognised methods is the most satisfactory and humane way of preventing horn growth. If all calves were treated in this way, much trouble would be saved later. Calves should be treated before they are 3 days old and there are two methods in common use. The horn buds can easily be felt and the hair round them should be clipped off.

1. **The cautery or debudding iron** is ideal. It consists of an electrically heated copper instrument of the shape shown in the diagram on this page or a fire-heated iron of the same shape. The iron should be heated to a cherry red and applied over the horn bud and moved back and forth until a copper-coloured ring of tissue shows right round the horn bud. This destroys the circulation of the developing horn and the bud eventually drops off. There is no wound, no infection, a poll of pleasing appearance, and, most essential, no horn growth.

2. **Chemicals:** Caustic soda or caustic potash are chemicals commonly used for destroying horn buds. A ring of petroleum jelly is smeared round the bud. The moistened caustic stick is then applied to the bud until the skin is red, but not more than slight bleeding should be caused. Calves must be protected from rain for some days, as rain will carry the caustic down the cheeks or into the eyes, causing irritation and sometimes blindness.

Another chemical which may be used when calves are from 1 day to 14 days old is a flexible paint made of antimony trichloride (28 per cent.), salicylic acid (7 per cent.), and flexible collodion (65 per cent.). The hair round the bud is clipped, the horn bud cleaned with methylated spirit, and the paint brushed on and allowed to harden. If the paint is used on an animal more than a week old, the tip of the horn bud should be cut off before the paint is applied.

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Meteorological Records for May

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	58.1	+ 1.8	72.2	39.5	7.56	18	+ 0.37	3.10	26	75.9
Auckland	160	58.4	+ 1.8	71.2	42.1	7.39	17	+ 2.60	1.84	1	101.6
Tauranga	10	54.5	+ 0.9	68.9	33.8	5.16	12	+ 0.03	1.88	1	120.1
Ruakura	131	52.3	+ 0.9	68.3	24.7	6.73	13	+ 2.13	1.82	1	103.4
Rotorua	969	51.4	+ 1.2	65.4	30.0	7.02	12	+ 1.74	1.76	1	110.1
Gisborne	12	53.4	+ 0.0	71.0	33.0	1.73	12	— 3.04	1.10	1	92.9
New Plymouth ..	160	54.8	+ 1.1	68.0	37.2	5.60	12	— 0.47	1.32	13	123.1
Napier	5	54.0	+ 1.2	72.4	35.0	2.21	11	— 1.13	1.40	1	124.0
Karioi	2125	46.8	+ 1.3	67.0	27.0	6.00	16	+ 1.98	0.84	28	
Wanganui	72	53.6	+ 0.6	69.8	32.9	3.01	13	— 0.11	0.56	14	91.7
Palmerston North .	110	51.6	+ 0.6	65.1	32.2	4.17	14	+ 0.85	0.78	14	97.8
Waingawa	350	49.9	+ 0.4	68.5	28.0	4.38	18	+ 0.33	1.30	16	85.7
Wellington	415	51.2	— 0.1	63.5	38.4	6.27	14	+ 1.71	1.36	15	87.1
Nelson airfield ..	5	50.1	+ 1.6	66.0	28.0	5.01	13	+ 1.97	1.56	26	131.0
Blenheim	12	50.4	+ 0.3	67.1	29.8	3.46	11	+ 0.93	0.78	13	126.2
Hokitika	12	49.4	+ 1.2	69.4	31.0	12.79	19	+ 3.51	3.47	23	95.3
Hanmer	1225	46.4	+ 1.6	67.0	22.0	2.24	13	— 2.24	0.54	2	108.7
Christchurch ..	22	49.0	+ 1.4	70.8	30.8	2.22	12	— 0.63	0.79	16	107.3
Ashburton	323	47.2	+ 0.5	69.0	26.8	1.27	9	— 1.28	0.47	13	119.0
Timaru	56	46.8	+ 0.0	67.8	27.4	1.33	9	— 0.20	0.48	14	126.1
Alexandra	520	43.2	+ 0.4	66.0	20.6	0.67	5	— 0.24	0.46	26	148.8
Taieri	80	44.6	— 1.3	63.3	24.7	0.79	13	— 1.30	0.28	26	99.7
Invercargill airfield	0	43.6	— 1.7	60.6	21.8	2.95	16	— 0.79	0.55	27	94.6

HEADING PHOTOGRAPH: The herd grazing a break on Mr. J. V. Tapper's farm at Okauia, on the western slopes of the Kaimai Range, 5 miles from Matamata.

Permanent Electric Fence Subdivision on a Hill Dairy Farm

By N. A. CLARKE, Instructor in Agriculture, Department of Agriculture, Matamata

THE electric fence is now an integral part of modern farm management. Since its introduction a few years ago the number sold each year has increased many times, and in some districts of the Waikato probably half the farmers now use it extensively. Because the electric fence is now so widely used for a variety of jobs, it is only natural that improvements have been made in design and methods of operation.

THE early type, barbed wire attached to insulated battens, quickly gave way to light wire on iron standards with rubber holders. The unit is now housed in a portable case and the wire is wound on a light reel. Sometimes the unit is housed at the cowshed and the wire is run down the fencelines. The wire can then be tapped at any point by a single wire to form a break.

Methods of operation have greatly improved since the electric fence was first used as a makeshift permanent fence and to keep the bulls in their paddock. Now it is used to break-feed crops and is the tool of successful grazing management.

Reasons for Development

Through trial and error the electric fence has been found to be an outstanding aid in improved herd and grazing management. It is mainly used to ration autumn-saved grass and early-spring growth, but more and more farmers are using it throughout the season and they are convinced that it pays. Electric fence operation is easy on flat, well-subdivided farms with a central race, but on hilly dairy farms paddocks are usually large and fences, gateways, and water supply are placed to fit in with the lie of the land. Thus the paddocks can vary greatly in size and have varying areas of flat, sidling, and top. With permanent fencing costing about £600 per mile on hill country, it is not surprising that paddocks tend to be large and therefore unevenly grazed. Many are unploughable and have to be improved by other means. In such paddocks the herd usually grazes on the sidlings and "camps" on the tops. Thus the tops are of high fertility and contain good grass and clover species, but the flats, and especially the sidlings, cannot hold the better pasture species.

Such farms need break feeding more than any other type to concentrate the stock on each part of the paddock in turn so that it will be grazed evenly and the pastures will be kept at an even fertility. However, break feeding of hill pastures can be laborious and awkward, and shifting of the electric fence into daily breaks is often impracticable.

Permanent Electric Fences

The farm described is at Okauia, on the western slopes of the Kaimai Range, which divides the Bay of Plenty from the Waikato. It is of 169 acres and is about 5 miles in a direct line from Matamata. The farm falls

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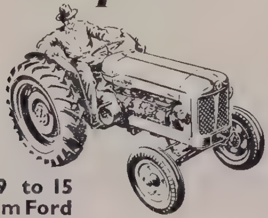

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away from its highest point of 535ft. above sea level to the Waihou River on the 100ft. contour. The property is farmed by the owner, Mr. J. V. Tapper, assisted by two sons Messrs. R. and J. Tapper. The system of permanent electric fencing was started 4 seasons ago by another son, Mr. H. Tapper, and has been carried on enthusiastically ever since.

Layout of System

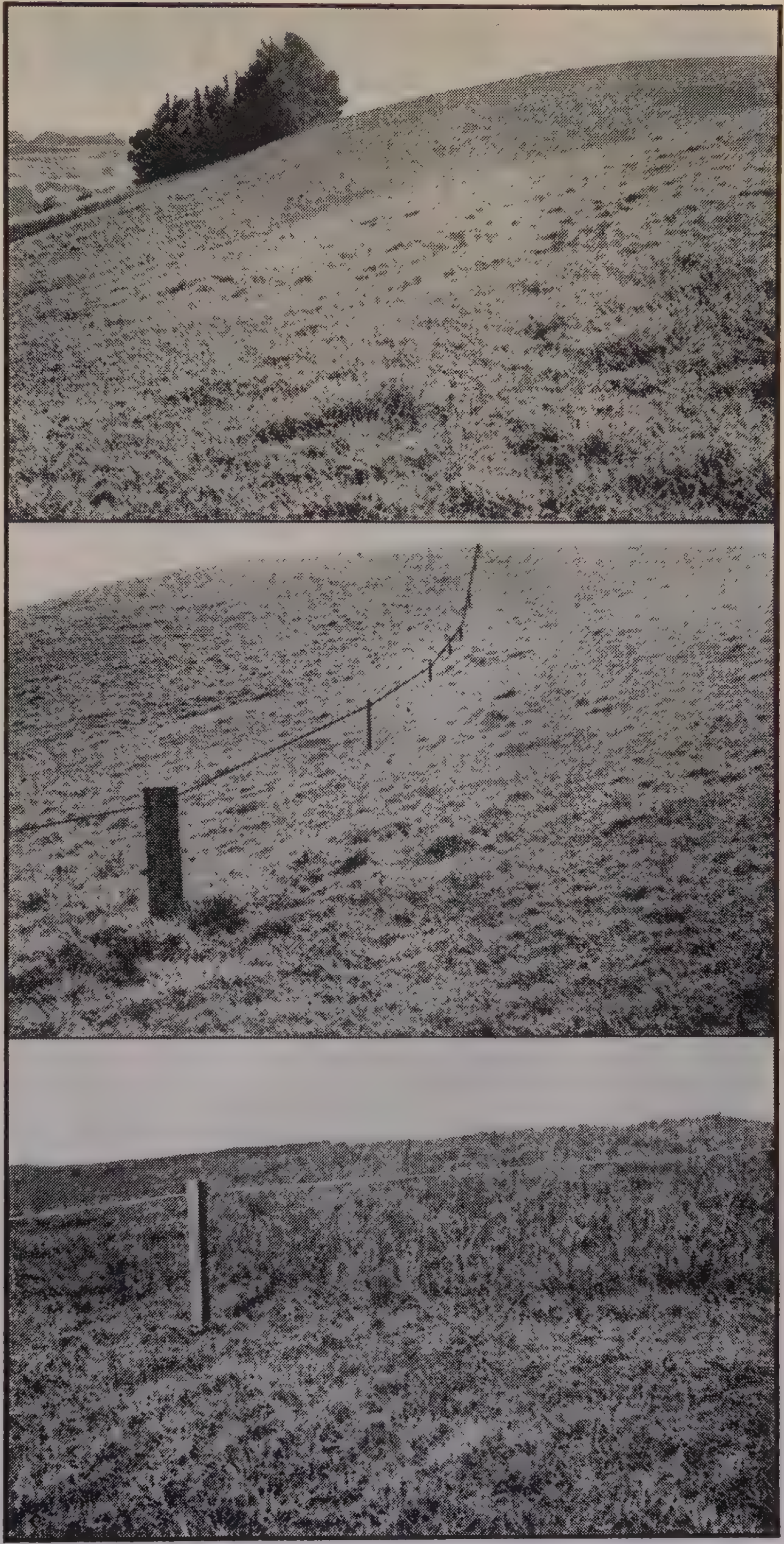
Now 6 paddocks totalling about 60 acres have permanent electric fences and it is planned to extend the system to other areas. On this farm only the flatter paddocks can be harvested and most of these are at the back. The herd is wintered on these paddocks and they are also used for day grazing.

Therefore the hill paddocks are always shut up for autumn-saved pasture. They are used as night paddocks until the silage paddocks are shut up, when they are grazed both night and day. It is these hill paddocks that have the permanent electric fences. The size of the break is about 12 hours' grazing for the 100 milking cows during late spring. The breaks are of between 2 and 3 acres, varying according to the fertility of the paddock. The subdivisions are placed so that there is no interference with the defined routes the tractor has to take to topdress the slopes. One paddock of 12 acres has 6 permanent subdivisions. A permanent alleyway follows one fenceline to allow the stock access to all the breaks, the water trough, and the gate.

The electric fence unit is housed at the cowshed. Three main leads to the paddocks are attached to poles on the fencelines 15ft. to 20ft. above the ground.

Each break has its own gateway and the wire is taken 15ft. above it, allowing all implements, including a mechanical stacker, ample clearance. Besides the master switch at the shed each paddock has its own switch at the gateway. The power can be turned off in any paddock to allow the gate to be opened and farm work to be carried on unhindered by live wires. A switch for each paddock helps in finding "shorts" in the electrical system, as each paddock can be tested individually. When the master switch is on at the shed each paddock can be switched on in turn and the fault traced. The system of permanent electric fences has been tried in the past, but has generally been abandoned because of the difficulty of finding shorts in a large system of wires. By having a switch for each paddock Mr. Tapper has successfully overcome this difficulty.

The breaks are fenced with totara stakes about 2ft. 6in. to 3ft. high and about 30ft. apart. One wire is used



Upper right—The top hill, showing something of the topography of the farm. The Matamata Plains are in the distance. Middle right—The top hill divided by a permanent electric fence. The standards are approximately 30ft. apart and the single wire is 3ft. above the ground. Lower right—Looking from a grazed break into an ungrazed break. Note the density of growth and evenness of the pastures.

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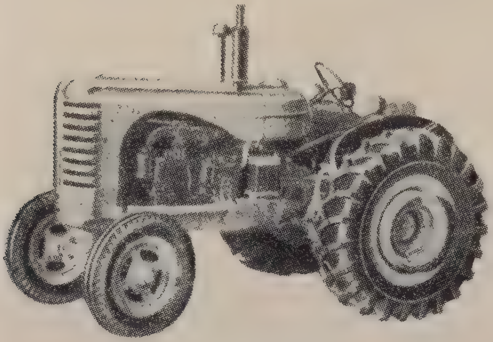

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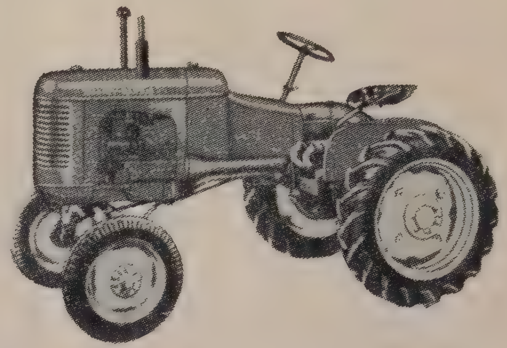

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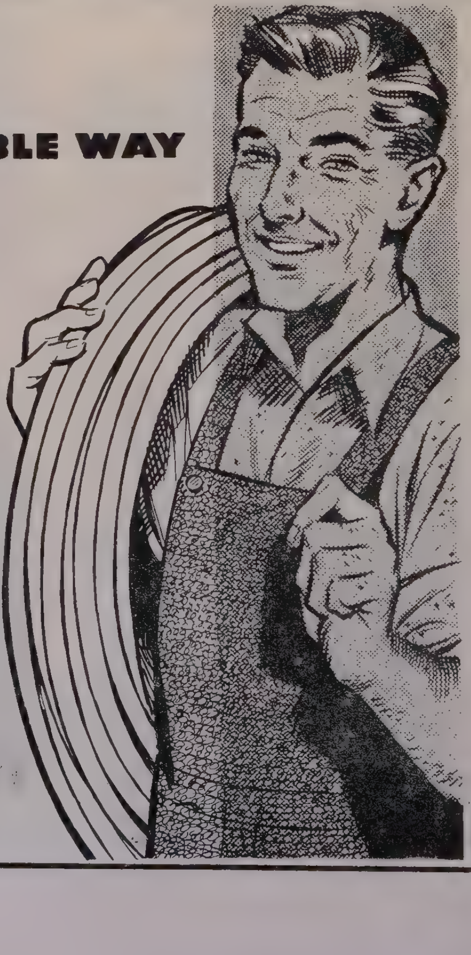

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2ft. 6in. above the ground. This may seem low, but it has been found that cows tend to go under an electric fence rather than over it and this height is the most satisfactory. Silage stacks are successfully fenced in this manner, as it is simple to take a lead from the nearest wire and erect a few battens round a stack.

Method of Operation

The breaks give about 12 hours' grazing for the herd and so a fresh break is used each grazing. In early spring, before all the herd is milking and the autumn-saved pasture is being rationed, one break may last 2 to 3 days. However, the break may be further subdivided simply by attaching a wire across the break from any desired position. Similarly in autumn one break may not be enough and the cows are then allowed access to two breaks.

The system saves much time, as the fence does not have to be shifted each day or moved from paddock to paddock every few days.

All that is necessary is to open the gate into the particular break in the paddock, switch on the power to all the fences in that paddock so that the herd can go only into the opened break, and once the herd is in the paddock shut the outside gate.

The only disadvantage in the system is that hand topdressing under fence-lines is necessary.

Advantages of System

The value of this system is proved by the evenness of the pastures over the paddocks where the system has been in operation for a season or two.

Not only are the pastures even through better-controlled grazing and the even spread of fertility, but these result in the encouragement of the better species of grasses and clovers. Therefore more grass is grown per acre, more cows can be carried, the fertility is consequently raised, and the cycle continues.

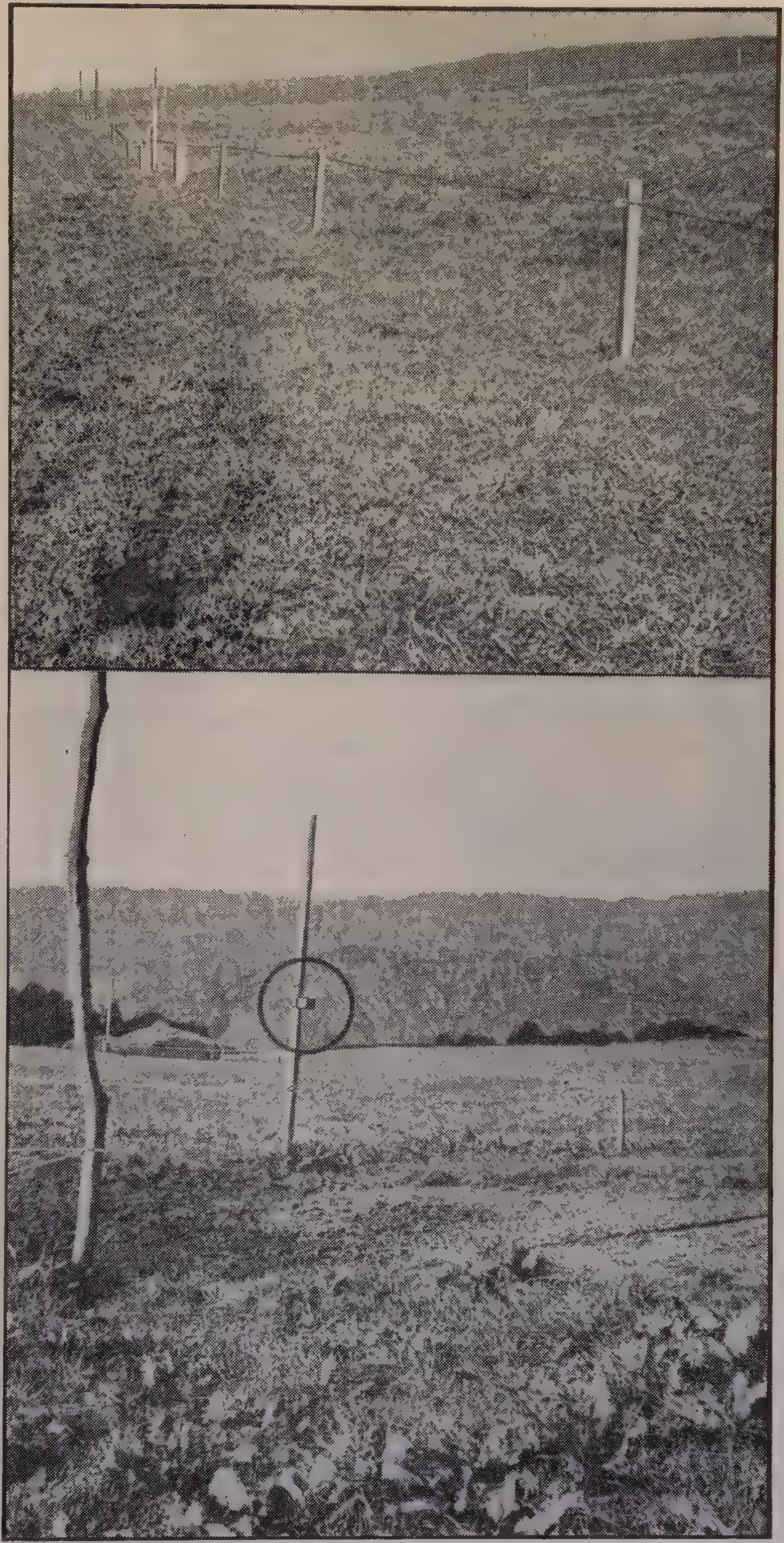
Once the system is established it is simply operated.

Installation and maintenance costs are low compared with those of permanent fencing.

A switch for each paddock and a master switch at the shed enable short-circuits to be easily traced.

Stacks can be fenced easily and effectively.

All the above factors outweigh many times the small disadvantages.



Upper right—This 12-acre paddock has 6 breaks. Access to all breaks is on the left and 3 breaks can be seen on the right. Lower right—Showing the gateway into a break. Note the switch (in dark circle) on the pole on the right and the silage stack in the background which is surrounded by an electric fence.

Care of Livestock during August

Contributed by the Animal Research Division

CALF REARING

CALVES should be fed their mothers' milk for the first 3 days. This is important, as the first milk, known as colostrum or "beastings", contains substances which increase a calf's resistance to scours. Since overfeeding is an important cause of this trouble, not more than 6 pints daily should be fed during the first week, 7 pints during the second week, and 8 pints during the third week. Diluting the milk ration with a quarter of its volume of water will also reduce the incidence of scours. If scours occur, a supply of a sulpha drug should be obtained from a Veterinarian immediately, as the drug is very effective when used promptly. Calves should not be kept in a calf paddock. When 2 to 3 weeks of age they should be rotationally grazed ahead of the cows. Alternatively, rotate the calves through a minimum of 5 cow paddocks, in which they should spend not more than 5 days at a time in any one paddock. Where good pasture is available calves can be weaned quite satisfactorily at 8 weeks. If whole milk is fed, there is no need to give more than 7 pints per day.

CARE OF THE CALVING COW

Cows about to calve should be brought into a handy paddock so that they can be kept under supervision. If a cow has difficulty in calving, veterinary assistance should be sought as soon as it is obvious that the presentation is not normal and in any case within 6 hours of the start of labour. Unskilled interference exhausts the cow and makes the Veterinarian's task more difficult or even impossible. Veterinary assistance should also be sought if the cow does not clean within 48 hours. Do not hang weights on the afterbirth.

FEEDING AFTER CALVING

Autumn-saved pasture is the best food for newly calved cows, but it must be grazed in small breaks which the cows will clean up in about 2 hours. The cows should continue to receive as much silage as they will eat and if the pasture is short and sappy, they should also receive hay.

SELECTION OF CALVES FOR REPLACEMENTS

The full sisters of high-producing heifers should always be kept, as should the daughters of Merit Sires with a high progeny test. Providing they are sturdy, the calves of very old cows with good life-time performances should always be kept, and there is no reason why the calves of well-bred heifers should not be kept. Twin heifers are seldom worth keeping and the twin of a bull calf should never be kept.

CARE OF LAMBING EWES

About 10 per cent. of all lambs are either born dead or die during the first week. These losses can be reduced by careful shepherding. Many lambs and some ewes can be saved by skilled assistance during lambing. Always use a reliable lubricating antiseptic on hands and wrists. Faulty presentations must be corrected. A lamb should never be forcibly pulled away when a leg or the head is turned back. A number of lambs die from suffocation through the cleanings remaining over their nostrils. These are very easily removed. Where necessary lambs should be assisted to get a drink. This is particularly important where ewes have very large teats. Drawing away a few squirts from these will reduce their size and enable the new-born lambs to suckle. Ewes with very large teats, very small teats, badly placed teats, or defective udders should be marked for culling. A big percentage of their lambs will die. Many lambs which die during cold or wet weather would survive if they got a good drink soon after birth.

MASTITIS

Milk from each quarter should be examined with a strip cup before milking. If it shows any abnormality or if the udder appears inflamed, treatment with penicillin should be started at once. Three tubes should always be injected at 24-hour intervals, even if the milk appears normal after the first tube. Prompt treatment early in lactation will often save a quarter which otherwise might become weak or even blind.

STERILITY IN COWS

If difficulty was experienced in getting cows in calf last summer, now is the time to seek veterinary advice to prevent similar trouble this year. Control of trichomoniasis depends on using only clean bulls and not mating cows for several months after calving. It is, therefore, too late to do anything if action is deferred until the mating season starts.

LICE ON CALVES

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes, of which those containing D.D.T. or "Gammexane" are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.

WORMS IN HORSES

Red worms reduce the efficiency of farm horses. Drenching with phenothiazine now will prevent the pastures becoming contaminated with eggs and thus reduce the chances of reinfestation in spring. As phenothiazine causes very severe reactions in some horses, dosing should be done under veterinary supervision wherever possible. If this cannot be arranged, divide the dose recommended on the package into 5 parts and give it over 5 days.

DISEASES OF CHICKS

Navel disease is contracted in the incubator, which should be scrupulously cleaned and fumigated with formalin between batches of chicks. Pullorum disease can only be controlled by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during May and for the 10 months ended 31 May 1953, with comparative figures for the same month and 10-monthly period of 1951-52, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

		Tons		Percentage
Period	Creamery	Whey	Total	inc. or dec.
May 1953	3,945	157	4,102	—
May 1952	3,248	107	3,355	—
Increase or decrease ..	+697	+50	+747	+22.265
10 months ended 31/5/53	159,267	3,120	162,387	—
10 months ended 31/5/52	154,468	2,636	157,104	—
Increase or decrease ..	+4,799	+484	+5,283	+3.362

Butter in store at 31 May 1953 was 15,597 tons

CHEESE

		Tons		Percentage
Period	White	Coloured	Total	inc. or dec.
May 1953	5,536	—	5,536	—
May 1952	4,404	3	4,407	—
Increase or decrease ..	+1,132	—3	+1,129	+25.618
10 months ended 31/5/53	101,482	140	101,622	—
10 months ended 31/5/52	89,902	751	90,653	—
Increase or decrease ..	+11,580	—611	+10,969	+12.099

Cheese in store at 31 May 1953 was 19,556 tons

If these figures are converted into butterfat equivalent, there is an increase of 5.165 per cent. in butterfat graded for the 10 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Land Improvement

Seasonal Notes by the Extension Division

If the standard of living at present enjoyed in New Zealand is to be maintained, exports and imports must increase at least proportionally in money terms with population; and progressive expansion of exports is dependent on an active programme of land improvement. A recent review of livestock numbers in various North Island districts indicates that scrub-land development and hill-country pasture improvement through discing or oversowing and topdressing have been important factors in expanding livestock numbers in recent years. There is still scope for a vast programme of land improvement, and now is a suitable time to plan next season's work in this sphere. Finance for marginal land improvement is available through the Marginal Lands Board. The work shows quite satisfactory returns at present and should continue to do so in the immediate future.

GUMLAND

Development of gumland should begin with the preliminary crushing and burning of scrub and fern. Heavy scrub is best crushed by a tracklaying tractor with scrub bar and heavy roller. A heavy roller fitted with steel flanges is very efficient for this work. A length of railway iron or a heavy swamp harrow with the spikes turned upward serves to flatten light scrub for obtaining a more efficient burn. Where the scrub is light and mixed with fern and rushes a satisfactory burn may be obtained without crushing, and gum holes and boggy areas can be more easily seen and avoided at the first discing. Seepage springs and boggy areas on the lower slopes should be drained with manuka fascine drains, but care must be taken, since the fact that the soil has been leached renders it liable to scouring and erosion if there is much fall. Burning the scrub in late summer aids germination of the manuka and gorse seedlings and allows subsequent discing to kill many of the seedlings.

CULTIVATION

Development of the heavy tracklaying tractor and giant discs has made it possible to develop gumland satisfactorily with surface working instead of ploughing. Giant discing should follow in autumn when rains have softened the surface of the clay soil and germinated any gorse seeds. Double discing is necessary for complete cultivation of the hollows and hard ridges and to obtain the maximum amount of weathering of the disced soil. Winter fallowing weathers down the clay and rots the mat of roots of rushes and scrub and the soil is left loose and friable for the following summer cultivation.

—*C. E. BALLINGER*

* * *

PUMICE LAND

SCRUB clearing on pumice land should follow similar lines to those described for gumland. In large-scale land development the land is usually ploughed and sown to permanent pasture in late spring or early autumn, but for the farmer who develops only a small area each year it is usually advisable to sow first to a temporary pasture, composed largely of red clover, follow the temporary pasture with a crop of roots, and then sow to permanent grass after discing the surface of the fed-off root-crop area. The red clover of the temporary pasture enriches the land in nitrogen and vegetable matter and brings about a great improvement in the strike of the permanent pasture.

—*C. R. TAYLOR*

* * *

DISCING OF HILL COUNTRY

A RECENT estimate suggests that there are about 3,000,000 acres of surface-sown hill country in the North Island which might be disced. Even if this estimate is somewhat high, it still opens great possibilities for land improvement and increased carrying capacity for hill-country pastoralists. Experience has shown that discing and resowing and topdressing raise 1 ewe country to 2½ ewe country, and in addition the better feeding of ewes through the taking of a winter forage crop before grassing has value in increasing wool weights. The first discing of surface-sown hill country in preparation for resowing to grass either direct or after a forage crop is usually done between March and June. This first discing moves only part of the soil, but in so doing allows partial fallowing without risk of erosion. If a forage crop is to be taken, subsequent working down should take place in August or September; and if the field is to be sown straight to grass, seed-bed preparation should be made between October and February.

Heavy scrub is best crushed by a tracklaying tractor with scrub bar and heavy roller with steel flanges. A length of railway iron or a heavy swamp harrow with the spikes turned up serves to flatten light scrub for obtaining an efficient burn.

—*L. H. ALSOP*

* * *

TOPDRESSING HILL COUNTRY

EXPANSION of hill-country topdressing combined with oversowing has been an important factor in increasing livestock numbers in the North Island. The extent to which hill-country topdressing has advanced during recent years is well illustrated by a selection of several representative counties and comparison of those where the practice is fairly new with those where it has been long established. Figures for the first group comparing topdressing in 1939-40 and 1951-52 are given below:—

	Percentage of grassland topdressed	
County	1939-40	1951-52
Raglan	45	66
Waitomo	26	52
Castlepoint	0.5	6

Raglan County development is outstanding in that 100,000 more acres were topdressed in 1951-52 than were topdressed in 1939-40. In the established dairy farming districts where topdressing has long been practised there has not been any very great expansion in the area top dressed, as can be seen from the following figures:—

	Percentage of grassland topdressed	
County	1939-40	1951-52
Franklin	75	79
Waipa	66	73
Waimate West	82	84

Undoubtedly the field for an expansion of topdressing lies in North Island hill-country pasture lands through the development of aerial topdressing. For this to be accomplished farmers will have to plan and construct landing-strip and fertiliser-storage facilities.

—*J. V. WHITE*

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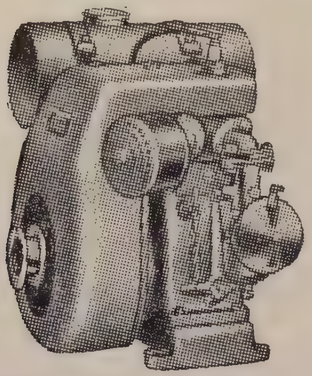

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Berry Fruits in the Home Garden

By W. G. CRAWFORD, Horticultural Instructor, Department of Agriculture, Oamaru

IN New Zealand at present there is a resurgence of interest in the growing of berry fruits. These small fruits are so useful in the home that every gardener should grow at least some of those most required by the household. The complete study of all small fruits is a long and comprehensive work, so in this article the culture of only a few is briefly discussed.

[*Hope Cross and Richardson*

A very good loganberry bush bearing a heavy crop on a 6-wire trellis.

A PRIMARY consideration in small fruit growing is the site, and this is particularly important to the commercial grower. Small fruits do not grow well under shaded conditions. Young growth does not ripen properly before winter frosts, and fruit is low in colour and late in maturing because of the cold soil conditions. If possible, a sunny, well-sheltered site should be chosen.

Soils

The condition of the soil is probably the most important single factor to be considered when a berry fruit garden is being planned. Soil texture is very important for all semi-permanent and permanent crops and especially for berry bushes and plants producing heavy crops. A soil with a good texture is one capable of retaining moisture and thus making available to the plant the nutrients necessary for good healthy growth over a long period. Soils of good texture do not dry out too early during the warm fruiting season or leach too freely as do sandy types; neither do they become waterlogged for a long period, and they can be worked under all but extreme conditions.

Good drainage is important, for without it air cannot penetrate and the roots cannot remain healthy. For the types of crops described in this article soil and drainage faults must be corrected at the start, as little can be done once the crop has been set out.

Preparation of the Soil

If the soil is heavy or sticky, it should be dug well to a depth of two spades, but at the same time care should be taken to see that not too much of the subsoil is brought to the surface. If compost is available, or better still if haystack bottom or stable manure can be obtained, 4 or 5 bushels to every 6 sq. yds. of land should be incorporated and worked in to a depth of 12in. On sandy soils the same quantity of compost should be added, but incorporated to a depth of only 3 to 6in.

Selecting Varieties

Many gardeners choose varieties from nurserymen's catalogues or from books, but they may not be suitable for a district other than the one in which the nurseryman is established. Some varieties may not adapt themselves to the climate of the new district or may make undesirable growth during late winter or early spring when, unless the plants are well sheltered, the foliage may be severely damaged or bruised. It is wise to make local inquiries before deciding on which varieties to buy. Berry fruits which show a quick return and require little extra trouble and skill beyond the ordinary cultivation are the most sought after, but others such as the loganberry and the boysenberry will well repay the extra time and trouble needed.

Early Planting Necessary

All kinds and varieties of berry fruits with the exception of strawberries should be planted as early as possible during the dormant season before frosts and heavy rains set in.

Strawberries may be planted any time from February onward until early spring. In districts where hard frosts are common, however, it is sometimes better to wait until spring unless the plants can be well established before winter frosts cause "lifting" of the soil. In most coastal districts February and March are the best months for planting.

When berry fruits are being planted out the holes should be dug sufficiently large for the roots to be spread evenly around them. A little soil should be sprinkled over the bottom roots and pressed firmly. This process should be repeated until the final 3in. of soil, which should not be pressed, has been filled in. The final filling in should leave the soil around the plants a little higher than the surrounding garden soil. This does not apply to strawberry plants, however, which are best planted with a trowel and firmed with the hands. When planting out has been completed the crowns should be just above the ground and the plants should be slightly deeper than they were in the nursery (this can be determined by the soil marks on the plants). Deep planting often results in the rotting of the crowns of strawberries, and shallow planting may cause the plants to die because the roots dry out.

Types of Berry Fruits

Loganberries and Boysenberries

Loganberries and boysenberries are best grown on a trellis 4 to 5ft. high. The new growth is allowed to run along the ground each season. No pruning is done until the crop is picked, when all the old wood that has borne fruit is cut to ground level and cleared from the trellis. The new wood which has grown during spring and summer should then be trained on the trellis. In some gardens this new growth is left on the ground until early spring and tied up just before the new growth begins.

Youngberries

Youngberries can be treated in the same way as loganberries, but in districts of high rainfall or where ample

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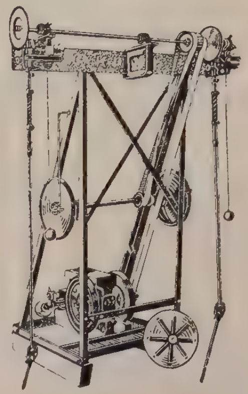

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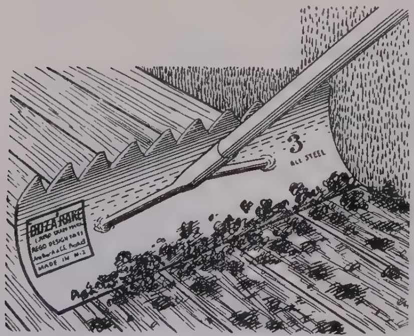

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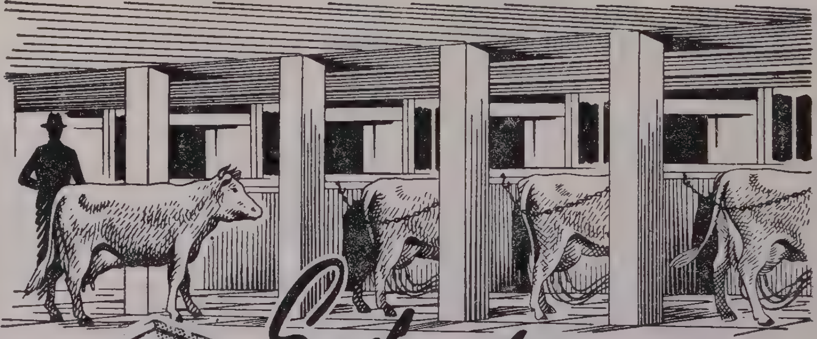

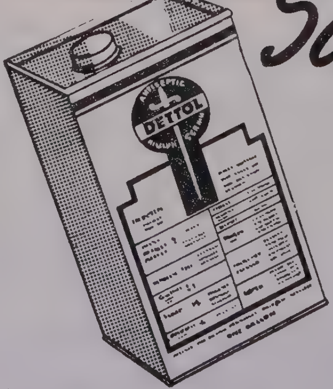

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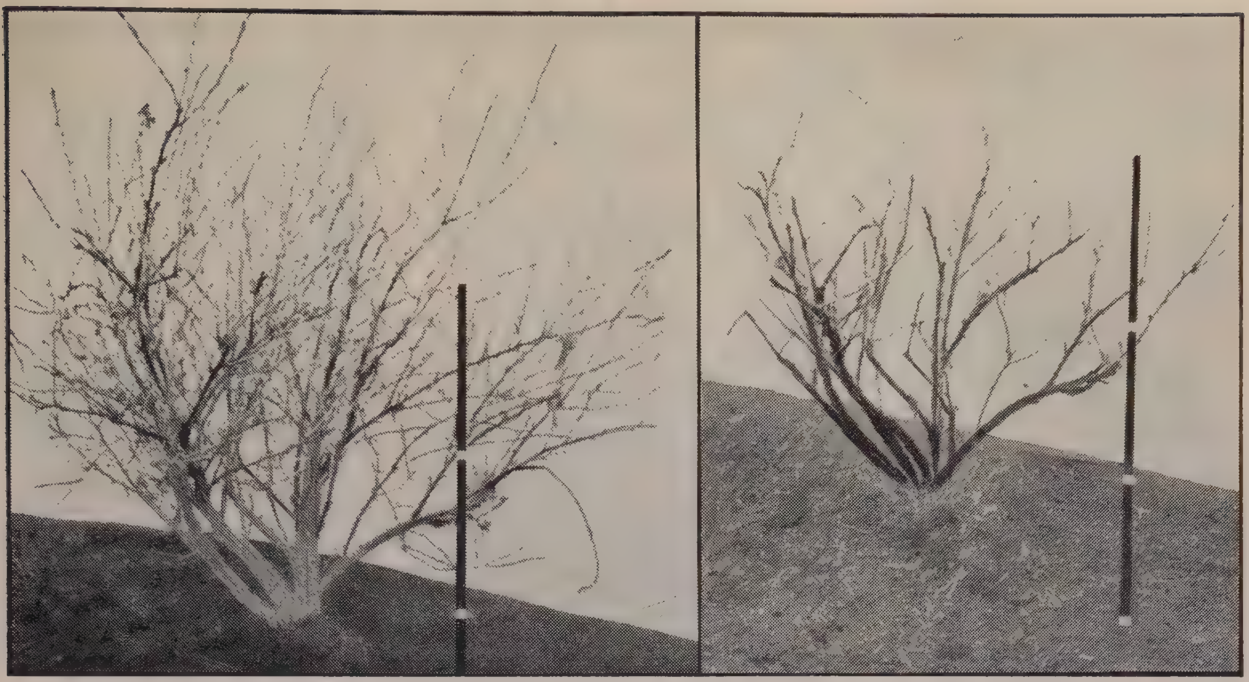

Left—A neglected gooseberry bush typical of many in home gardens. Right—The same bush after pruning.

supplies of water are available the following method may be preferred.

The first season all the vine growth should be left on the ground and the longest runners kept back in line with the row. The vines should be left on the ground until spring, and when the leaf buds are just beginning to start movement they should be tied on to the trellis. Provided the vines have been well cared for during the previous summer and a plentiful supply of water and manure has been available, growth should be very heavy at this time, and the long canes are best headed back a few feet. Small surplus canes should be cut out altogether. Only sufficient wood to cover the trellis without overcrowding should be kept. About 2 weeks before the berries start to ripen the rows should be inspected and any surplus growth that may be in the way cut out.

After the crop has been harvested the whole vine should be cut off 1in. above the ground with a sharp hoe or sickle and the ground should be well cultivated, manured, and thoroughly watered. The vine will then make sufficient growth for the following season, when it should be handled in exactly the same way. If this system is to be adopted, the old vine must be cut out immediately the crop has been picked and the plant must be given a continuous supply of water throughout the remainder of summer and autumn.

Raspberries

Planting of raspberries is usually carried out during winter or early spring before the buds start to burst. Raspberries are best cut back from 6 to 12in. from the ground when they are set out. When the suckers or next year's fruiting canes attain the same height as the original plantings the old canes should be cut out at ground level and burnt. This early cutting back helps to eliminate diseases carried on the old canes and prohibits the canes from fruiting for the first year, thus helping to build up the plants.

In the next spring further suckers will be noticed growing up through the bush. These should be cared for and not broken or damaged as they provide next year's fruiting crop. The bushes should be inspected three or four times during the season and any suckers coming up between the plants and between the rows should be hoed out. Immediately the crop is picked all the old fruiting canes should be cut off at ground level. This early cutting out allows better penetration of sunshine and circulation of air round the advanced suckers and helps considerably in ripening the wood to withstand the winter frosts. The number of advanced suckers or new season's canes which should be left depends primarily on the vigour of the canes. If the canes are strong and vigorous in growth, 12 to 16 are considered sufficient, but if they are less vigorous, 6 to 10 are enough. All prunings are best burnt as soon as possible after removal from the garden as a precaution against disease.

Gooseberries

Provided the soil is in a suitable condition, late autumn or early winter is the best time for setting out gooseberry bushes in most districts. Spring planting is advisable in districts where severe frosts are likely. When the bushes are being planted out leaders should be shortened back severely. Gooseberry bushes are often incorrectly pruned, and during the season look more like porcupines than gooseberry bushes.

When pruning a gooseberry bush the pruner should try to visualise a bush in full leaf carrying a crop of fruit. Gooseberries fruit on the previous season's growth and on wood up to 9 or 10 years old, but the choicest fruit is always from growth 1 to 3 years old. The aim of the pruner should therefore be to have a cycle of the renewal of wood every 3 years. If a branch is not required, it should be taken off close to the main framework of the bush. Clipping the ends of branches should be discouraged, as it only increases undesirable and excess growth. Unwanted new growth should also be taken out. The harder a bush is cut the more it grows; therefore weak and old bushes can often be improved by hard cutting.

Strawberries

Immediately after strawberries have been harvested many growers like to clean up the area by burning off or collecting and burning all the old leaves. The best method is to place a layer of dry straw over the bushes and light it. Care must be taken, however, to see that a suitable breeze is blowing so that the fire will be carried quickly through the strawberry area; otherwise the crowns of the plants may be damaged. Burning helps considerably in preventing diseases from carrying over from one season to another.

Moisture Requirements

There are some kinds of berry fruits which will grow and produce fruits with very little moisture in the soil, but if crops of fine fruits are to be obtained, ample soil moisture or a suitable rainfall is very important. No set of rules can be laid down which will apply in all cases because of the vast differences in the water-holding capacities of the soils and the climatic conditions of the various districts.

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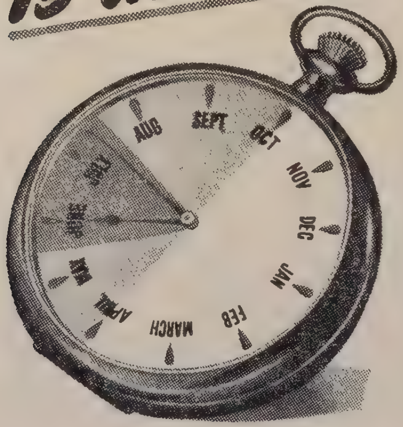

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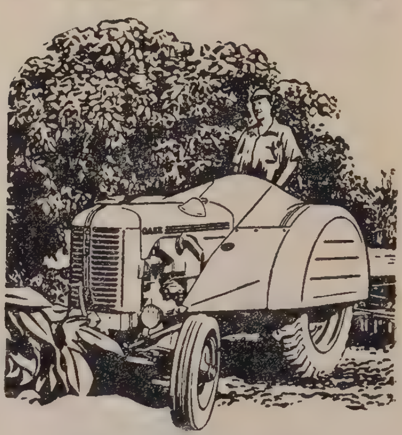

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Sandy soils need water more often than do heavier soils. To ensure good bushes and crops the grower should see that berry fruits have sufficient moisture to keep them growing well throughout the entire summer. It is also most important to water them well again at the end of the fruiting season and immediately after pruning and burning. The amount given and the application of water around bushes are important. If the plants are 4ft. high, the roots will probably be 6 to 8ft. long, so if the water is applied to the area around the base of the plant, most of the roots are still dry. An area several feet on each side of the plants should receive a thorough soaking.

Cultivation

Crops growing in open ground must be kept free of weeds if best results are to be obtained from the soil. If the season is wet, more cultivation will be necessary than during a dry season favourable for weed destruction. Generally, however, three main cultivations are necessary. The first is carried out as soon as the crop has been picked and the bushes have been pruned, the second in early spring, and the third some time just before the flowers set or the area is mulched down. Other cultivation may be necessary also to keep weeds in check.

The method of cultivation is most important. All berry plants produce fairly large numbers of surface roots, so it is essential that only shallow cultivation be carried out; otherwise roots may be damaged.

Fertilising the Crop

On all soils it is wise to fertilise berry fruits. Cow manure and haystack bottoms spread to a depth of 3 to 4in. over the surface of the soil and lightly hoed in during late autumn or immediately after the final clean up are excellent. For heavy soils stable manure supplemented with artificial fertiliser has given good results and usually increases the size of the fruit considerably. Fowl manure and litter at the rate of 2lb. to the square yard is also a good manure when applied just before winter.

If organic manures cannot be obtained, a general mixture of 4 parts of phosphate, 2 parts of sulphate of potash, 2 parts of blood and bone, and 1 part of sulphate of ammonia applied at the rate of 3oz. to the square yard will help to maintain soil fertility and the production of good crops. These fertilisers are best applied in two dressings—a third in autumn and the other two-thirds in spring before growth starts—and should be lightly hoed in and watered.

Mulching

The benefit mulching has on improving a berry fruit crop cannot be overemphasised, particularly on sandy soils. It helps to prevent the soil from cracking and packing, checks weed growth, helps to conserve moisture, and promotes a cool root run, which aids good fruiting during the hot days of summer. A mulch around strawberry plants prevents fruit from being splashed with mud and reduces the amount of fruit damaged by contact with the soil. Clean straw is generally preferred to hay because of the seeds and weeds which hay often carries.

[*Douglas Elliott*

Auchincruive Climax strawberry fruit. This is possibly the most promising strawberry variety available at present.

Diseases and Pests

Many crops of berry fruits are reduced considerably each year by diseases and pests, and the work of growing the bush should not be wasted through the risk of plant injury from diseases and pests.

Diseases affecting raspberries, strawberries, and gooseberries are dealt with in Department of Agriculture Bulletins Nos. 258, 321, and 297 respectively, all available free from offices of the Department, and no mention of these three crops will be made here. Only the principal pests likely to trouble growers are mentioned.

Leaf Roller Caterpillar (*Tortrix* spp.)

The leaf roller caterpillar is light green and protects itself from its natural enemies by sheltering between two leaves or by rolling a leaf around itself. It moves quickly when disturbed and will sometimes drop to the ground.

Control consists of spraying the foliage with a solution of 1½lb. of arsenate of lead, 3lb. of hydrated lime, and 100 gallons of water. A small quantity can be made with 1oz. of arsenate of lead, 2oz. of hydrated lime, and 4 gallons of water.

Raspberry Bud Moth (*Carposina adreptella*)

The larvae of the raspberry bud moth do considerable damage not only to raspberry plantations but to other bramble fruits. The moth lays its eggs in crevices of the leaves and in buds on the bushes during summer and autumn. The eggs hatch in from 7 to 20 days, depending on weather conditions. The larvae tunnel into the young, dormant buds to enter the cane, causing considerable damage and reduction of crop the following year.

The raspberry bud moth can be controlled by spraying the plants with a solution of 2lb. of arsenate of lead, 4lb. of hydrated lime, and 100 gallons of water. A small quantity can be made by mixing 1¼oz. of arsenate of lead, 2½oz. of hydrated lime, and 4 gallons of water.

Red Spider (*Tetranychus* sp.)

When plants are affected with red spider the leaves take on a red, rusty appearance, and during hot, dry seasons the pest can do enormous damage if left unchecked.

Red spider can be controlled by spraying the under sides of the leaves thoroughly with a solution of 1 part of summer oil to 100 parts of water. Eggs usually take 10 to 14 days to hatch, so a further spraying is necessary. A small quantity can be made by mixing 6¼ fl. oz. of summer oil with 4 gallons of water.

White Rose Scale (*Aulacaspis rosae*) and **Lecanium Scale** (*Eulecanium corni*)

White rose scale and lecanium scale suck the sap from the plants and thus weaken them considerably. They can be controlled by spraying the plants in the dormant season with 5 per cent. winter oil in the ratio of 1 part of winter oil to 17 parts of water or with 1 part of lime sulphur to 15 parts of water. Four gallons of oil spray can be made by mixing 1 pint 18 fl. oz. of oil with 4 gallons of water. If hard water is used, the addition of soap powder will assist in emulsifying the mixture. Four gallons of lime sulphur can be made by mixing 2 pints 4 fl. oz. of lime sulphur with 4 gallons of water.

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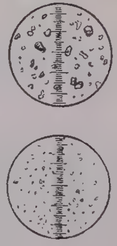

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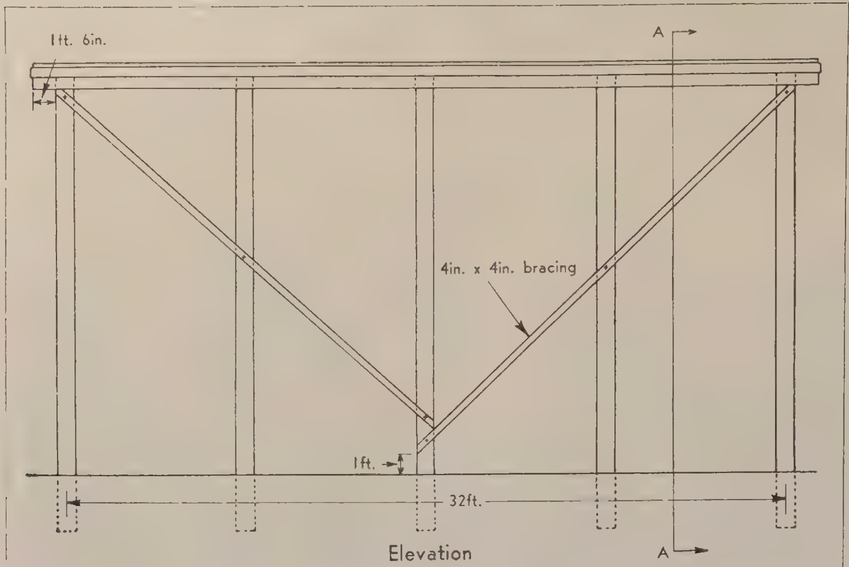
MORE and more farmers are turning to baling for easier handling of their hay, and where hay is baled hay barns make for better and easier storage, because a permanent storage place does away with the annual topping, roofing, and fencing of stacks. Past difficulties with centrally situated hay storage have been largely overcome by the greater use of motor transport on farms. Implement sheds are necessary if farm implements and machinery are to be looked after.

MOST hay barns and implement sheds today are constructed of high-grade sawn timber, which must be of large dimensions to support the wide roof spans necessary. The cost is accordingly high. Using poles for uprights in hay barns, implement sheds, and similar farm and commercial buildings has proved cheaper and quicker. In the United States, for example, pole structures, although in use for many years, have recently become very popular.

Suitable poles are available from the exotic forests, which now hold an important place in the country's economy, or they may be grown in a farmer's own wood lot. Between the planting and harvesting of a crop of trees the forest must be thinned at various stages if a good yield of quality timber is to be obtained at the final clear-felling. Thinnings of larch (*Larix decidua*) and Douglas fir (*Pseudotsuga taxifolia*) trimmed, cut to suitable length, peeled, seasoned, and treated have already found a ready market throughout New Zealand as power and telephone poles. Larch and Douglas fir are superior types of softwood with comparatively high strength values and small natural defects. Although the heartwood is resistant to the penetration of preservatives, this is no problem where the timber is used as a natural round with the sapwood intact, as the sapwood can be penetrated reasonably well to ensure a satisfactory treatment for outdoor use.

HEADING PHOTOGRAPH: Hay barn near Rotorua built with treated poles. Below—Implement shed near Rotorua built with treated poles.



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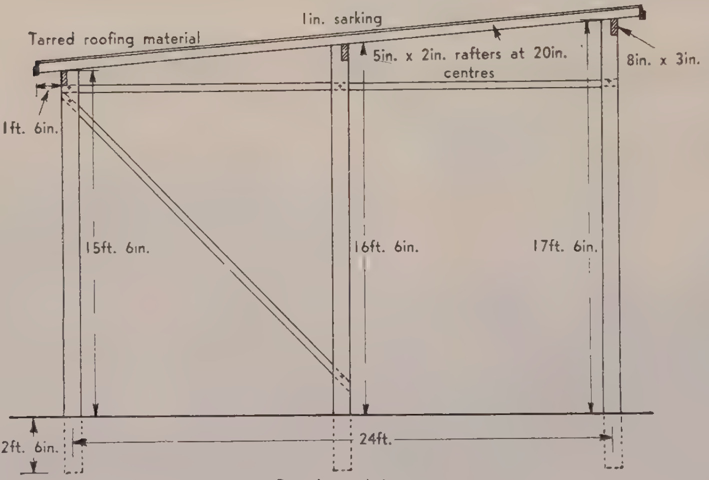

Section AA

As soon as they have been felled thinnings intended for sale as poles should be peeled and barked as a first protection against attack by wood-boring insects and wood-rotting fungi. Next they should be air-seasoned, which normally takes somewhat more than 12 months. The poles should then be preserved by forcing into the timber coal-tar creosote or pentachlorphenol in fuel oil, which penetrates the sapwood over the full length of the pole, forming a protective sheath around the naturally durable heartwood. Service tests in New Zealand, America, Australia, and other countries have shown that poles treated in this way will have a long service life.

The construction of a hay barn 32ft. x 24ft. is illustrated, and it may be seen how simply a barn can be built with poles. No special skill is required, and a strong, long-lived structure can be built. These treated poles may be purchased from the New Zealand Forest Service and are ideal for the purpose, provided certain care is taken in erection. That is, all cutting and boring of the treated pole should be confined to that part well clear of the ground line. Where the protective shell is broken by fixing and fastening the other members the untreated wood exposed should receive several liberal applications of hot creosote. Driving nails into the pole will not affect its durability, but any cutting or boring should be retreated as mentioned.

Timber used in its natural round state retains its full strength properties. This is particularly important in this kind of construction where maximum height with strength is so necessary.

The design illustrated has an inside height of 15ft. 6in. at the lower end. With a floor measurement of 36ft. x 24ft., this hay barn will hold 1400 bales of the usual dimension (3ft. 6in. x 1ft. 6in. x 1ft. 4in.) or 50 tons of hay. As no separate foundation is required and as the material used is cheap in comparison with the construction materials formerly used, the total cost is very reasonable.

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Book Review

"Year Book of Agricultural Co-operation"

IN New Zealand co-operation in agriculture, though not by any means confined to the processing of dairy produce, has met with its greatest success in that field. Co-operation in the production of farm produce is virtually unknown in this country, and for that reason its significance in many other lands may not be fully appreciated. Where farms are small and holdings are scattered co-operation frequently provides the only means by which new and improved methods of management can be economically adopted.

For that reason the "Year Book of Agricultural Co-operation" for 1952, issued by the Horace Plunket Foundation, is of particular value in these days of increasing interest in the economic progress of under-developed countries.

In addition to sections on the work of the International Labour Office and the Food and Agriculture Organization in the co-operative field, the book contains reviews of co-operation in both production and marketing in a wide range of countries, among which are the United States, the United Kingdom, several European nations, and many of the Commonwealth countries, including Crown Colonies and Protectorates. In some cases only recent developments are covered, in others important changes since the war are outlined, with a few countries the growth from the beginnings of the various movements is dealt with, but in all the accounts a comprehensive outline of the present situation is given.

The book is of particular interest and value to administrators in countries concerned with such projects as the Colombo Plan and the South Pacific Commission. It would also be of interest to farmers and farm organisations, however, because of its comprehensive picture of the wide field covered by the co-operative movement in many other countries, including some with well-advanced systems of farming.

—*J.V.W.*

Macmillan and Co. Ltd., London. 21s.

Publications Received

"New Zealand Flock Book", vol. XLVIII, Council of the New Zealand Sheep Breeders' Association.

"Farmer & Stock-Breeder Year Book 1953", 77th Edition, Farmer and Stock-Breeder Publications Ltd., Dorset House, Stamford St., London SE1. 10s. 6d.

"Proceedings of Waikato Nitrogen Conference", Imperial Chemical Industries (N.Z.) Ltd.

"Industrial Fibres", Commonwealth Economic Committee, London. 5s. net.

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"Ironstone Country" in Northland

By **C. E. BALLINGER**, Instructor in Agriculture, Department of Agriculture, Whangarei

OF the large areas of land in Northland as yet undeveloped one of the largest is an area of volcanic and other soil types known as the "ironstone country". It is situated in the northern portion of Bay of Islands County and extends north into Whangaroa County. The ironstone area would be enclosed in lines drawn approximately from Okaihau north-east past the Puketi forest to Kaeo, from Okaihau to within about 3 miles of Kerikeri, and thence to the coast at Takou Bay and across to Kaeo.

THE area is about 50,000 to 60,000 acres and is mostly easy sloping country workable by tractor and with some steep gullies in which there are the remains of the original bush. In general, however, the land is open and covered with light scrub, fern, and patches of gorse. The slopes run up from a little above sea level to about 1200ft.

Climate

The climate is similar to those of other easterly districts in Northland, with a prevailing south-westerly wind and the tendency for summer and autumn to be dry. Rainfall figures for the ironstone country can only be estimated from those taken at points near the area. Kaikohe, about 6 miles south of the area, has a rainfall of about 70in.; Kerikeri, about 3 miles east, about 65in. Figures obtained from the New Zealand Forest Service, taken at a new station in the centre of the area for 2 years from September 1950 to August 1952 show a rainfall of about 80in. The Puketi forest, on the western side of the area, experiences a high rainfall, but this falls off rapidly on the eastern side of the ironstone country. The water supply in this volcanic land is good; creeks are permanent almost without exception even in severe drought.

Soils

The ironstone country derived its name from the ironstone pellet formation in the basalt volcanic soils, but the term has been applied in a general way to the entire area, which has running through it large areas of other soils, some of them not of volcanic origin. The true ironstone soil type is the Okaihau gravelly friable clay, a mature basalt volcanic soil shown on the soil map by the symbol OK. A slightly better type of ironstone soil is the Taraire gravelly friable clay (TA) on the Matauri Bay Road. Of the other soil types, some differ from the true ironstone in degree of maturity or leaching.

Though, as with most soil types, the Okaihau gravelly friable clay varies, typical soil has a profile of dark brown topsoil of about 4in. and a lighter subsoil. The profile contains ironstone pellets ranging from the size of peas up to 1in. or more in diameter. The main layer of pellets in many places is thin and is 18in. below the surface, but in other places it is thick and extends to the surface.

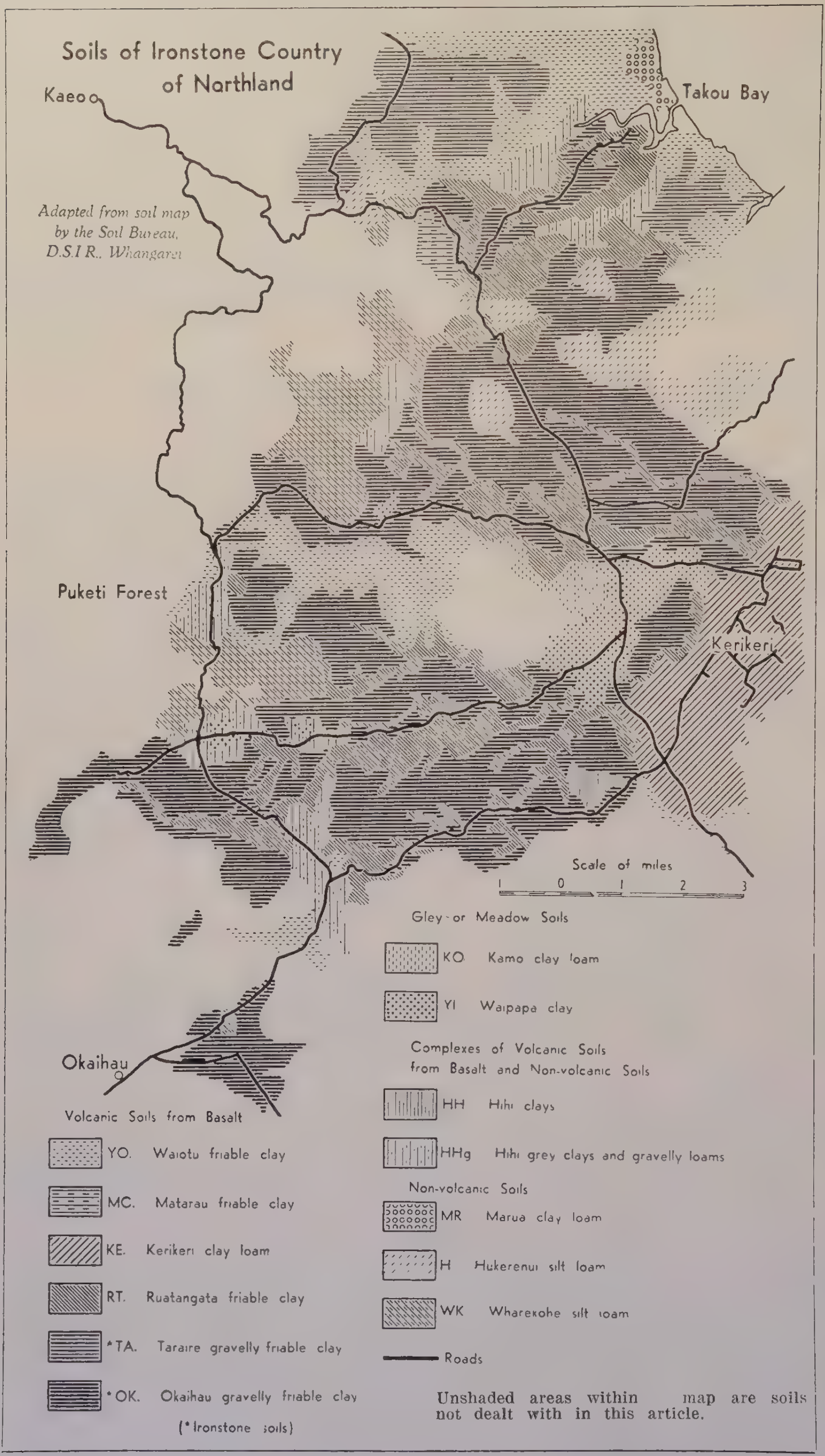
In many of the higher and more exposed positions wind and water erosion have frequently removed the fine topsoil, leaving the ironstone pellets as a layer on the surface, and from these areas the term ironstone soils has been derived. The erosion has been helped by the frequent burning of scrub and fern.

Throughout the ironstone country are areas of less leached volcanic soils, the most important of which is the Ruatangata friable clay (RT), a semi-mature basalt volcanic soil often found in areas running parallel to the creeks; in some instances the areas may be strips a few chains wide along the easy slopes of broad gullies.

A third volcanic type similar to the Ruatangata friable clay is the Waiotu friable clay (YO), which is found in fairly large areas in the north-east.

These are the three main volcanic soil types in the ironstone country. There are also small areas of gleyed or meadow soils which have been derived from basalt alluvium. These soils are grey-black. One area, Waipapa clay (YI), lies a little to the north-west of Kerikeri. The Hihi complex has been derived from a mixture of volcanic

HEADING PHOTOGRAPH: Typical undeveloped ironstone country, showing easy, undulating nature of the land. Below—Land in process of development (foreground) and Kapiro block, Waipapa (background).


Soils of Ironstone Country of Northland
Kaeo
Takou Bay
Puketi Forest
Kerikeri
Okaihau
Scale of miles
1 0 1 2 3
Volcanic Soils from Basalt
YO. Waiotu friable clay
MC. Matarau friable clay
KE. Kerikeri clay loam
RT. Ruatangata friable clay
*TA. Taraire gravelly friable clay
*OK. Okaihau gravelly friable clay
(*Ironstone soils)
Gley-or Meadow Soils
KO Kamo clay loam
YI Waipapa clay
Complexes of Volcanic Soils from Basalt and Non-volcanic Soils
HH Hihi clays
HHg Hihi grey clays and gravelly loams
Non-volcanic Soils
MR Marua clay loam
H Hukerenui silt loam
WK Wharekohe silt loam
Roads

Adapted from soil map by the Soil Bureau, D.S.I.R., Whangarei

Unshaded areas within map are soils not dealt with in this article.

and sedimentary clay material. In addition to these there are areas of gumland and other clay soils common to Northland and not of volcanic origin. There are also considerable areas where the soil shows a transition from one type to another.

The main volcanic types are free draining and easy to cultivate, but the natural fertility is low and pastures not properly topdressed revert to danthonia and *Lotus hispidus* or to scrub.

Farms situated in what is looked on as the ironstone country tend to be round the edge of the area or in places where the soil has been found to be of a better type. Many farms may have soil of more than one type, although the natural vegetation or the pasture may not indicate this.

The low food value of dry danthonia and an absence of clovers through lack of fertiliser are often the reasons for livestock being seen in poor condition compared with stock on more fertile land. However, the mature soil type Okaihau friable clay and the adjacent slightly less leached Kerikeri clay have been found slightly cobalt deficient. On those few farms at present on this soil type the deficiency is corrected by using cobalt in licks or topdressing. On farms where areas embrace several soil types stock are not affected, as they obtain sufficient cobalt from soils adequately supplied.

Shelter

Shelter is important on much of this area. *Pinus radiata* and *Cupressus macrocarpa* grow satisfactorily on the volcanic soils and *Hakea saligna*, which makes excellent shelter, does well and is growing wild in many places. The following eucalypts or gums (list supplied by the New Zealand Forest Service) have been found to grow well: *E. macarthuri, E. saligna, E. botryoides, E. eugenioides*, and *E. regnans*.

Development and Utilisation

Recent advances in soil science and mechanical equipment, coupled with the need for land development and greater food production, have made the ironstone country an area in which interest has increased in recent years.

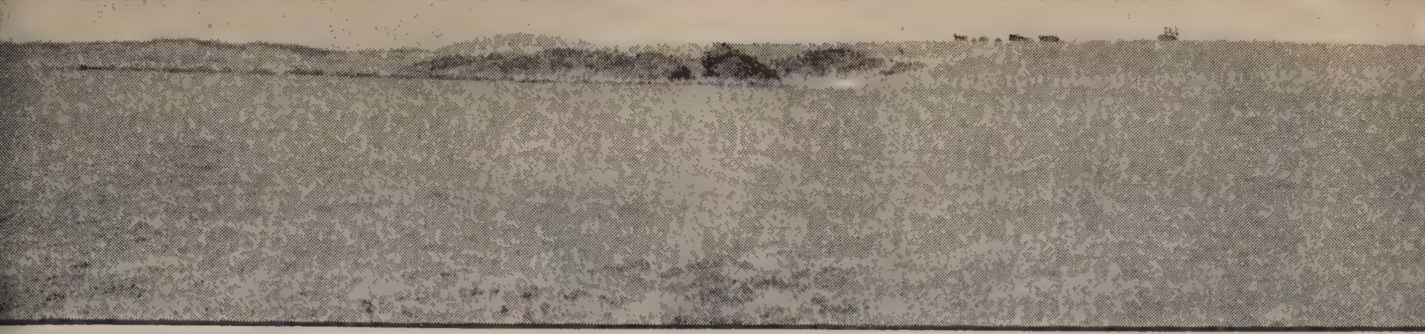
Trials were begun on a 20-acre area of Okaihau gravelly friable clay at Waipapa by the Department of Agriculture in 1926 and responses to lime, phosphate, and potash were noted. The trial area was abandoned during the depression of the 1930s, but examination of the area in 1937 showed that some clover, paspalum, and other pasture plants were persisting. In 1940 the area was sown to good pasture by the Department of Lands and Survey. This has been maintained since with normal dressings of lime and phosphate. A mowing trial on an adjacent field laid down in 1939 has shown a pasture response of about 20 per cent. to the application of potash. In 1946 trials carried out on poor, old-established pasture showed that the main deficiencies were lime, phosphate, and potash, and a small molybdenum response was obtained. These trials indicated that the lime requirement was not great and that at least 3cwt. of phosphates and 1cwt. of potash per acre were needed annually, at least for the first few years.

Large-scale Development

Development of the ironstone country on a large scale began in 1949 when the Department of Lands and Survey grassed down a 500-acre block mainly of the ironstone soil type. This area is now successfully carrying dairy stock, run cattle, and sheep. A further 600 acres of ironstone land were grassed down in March and April of 1952 and further large-scale development is in progress.

General observations and the experience of farmers on the area, substantiated by manurial trials in different localities and on new and old pastures, prove that the development of this onetime problem country for dairying or sheep farming does not present serious difficulties.

Most volcanic land in Northland dries out quickly, and the ironstone



The paddock where the Department of Agriculture started trials in 1926 which were abandoned in the depression of the 1930s. The area was regrassed in 1940 and has been maintained since with normal dressings of lime and phosphate.

country is no exception. This, coupled with the tendency for late summer and autumn to be dry, makes it necessary for the dairying season to begin early, in May or early June. Fat lamb production does not require the same length of season, and for these reasons the climate is more suitable for sheep than dairying, although with good ryegrass pastures to provide grass for early calving there is no reason why dairying cannot be successful in this area, and it is in fact already being carried out economically there. Mild winter temperatures and free-draining soil make conditions suitable for early calving if hay, silage, and autumn-saved pasture are provided.

Cultivation

The volcanic soils of the area are free-working clays which are easily giant disced and worked down to a seed-bed. The low-growing scrub fern, often not more than 2ft. high, can be easily dealt with by modern implements. Patches of gorse can be crushed and burnt in autumn. The heat promotes a good germination of dormant seed and subsequent discing kills the seedlings.

The land should be worked down to a seed-bed by spring and left until gorse seeds germinate. Surface cultivation through summer will kill most of the remaining seedlings and survivors can be killed with the hormone 2,4,5-T after sowing down to pasture, which should take place in autumn.

Cropping

There does not appear to be any scope for extensive cropping on the ironstone country. Lack of moisture in late summer and autumn and high temperatures prevent good swede crops being raised. Soft turnips are sometimes grown satisfactorily for feeding out after Christmas, if the land is well manured with phosphatic, nitrogenous, and probably potassic fertilisers. Lack of moisture and fertility would preclude maize growing.

Pasture Establishment

There is no difficulty in establishing good ryegrass-paspalum-clover pasture. Cocksfoot also does well if not grazed closely, and the well-drained soils make conditions suitable for the three main clovers, white, subterranean, and red. Red clover is of value if treated leniently in late summer. Paspalum should be included in any seed mixture. A suitable mixture for a dairy pasture is 20lb. of perennial ryegrass, 5 to 10lb. of Italian or short-rotation ryegrass, 3lb. of white clover, 2lb. of subterranean clover, 2lb. of red clover, 5lb. of paspalum, and 5lb. of cocksfoot. The cocksfoot should be replaced by 4lb. of crested dogstail for sheep farming. Probably subterranean clover could be omitted from pastures intended for dairying.

Where short-rotation ryegrass has been sown on the ironstone country its behaviour has been similar to that of Italian ryegrass; there is good growth in the first winter, but rapid thinning out the following summer, and very little survives by the following year. New pastures tend to go through three phases. The first winter they are predominantly grass. This thins out and the following year they are clover dominant. With adequate topdressing the clovers build up fertility and grasses then build up over a period of years to form a balanced sward. Close grazing encourages clover dominance and is to be avoided in the dry summer and autumn, when a good cover gives some protection to the young plants and holds the moisture.

Lime and Fertiliser

Lime: It is commonly believed that the ironstone country needs large quantities of lime, with 2 to 3 tons per acre as an initial dressing. Soil analysis and trials do not support this view. The acidity is not high and a pH of 5.8 in undeveloped or poor pasture land is normal. Heavy liming, therefore, will not give the response that is found on the clay soils and may make unavailable such elements as boron. Analysis of ironstone soil samples taken at various points on the area shows an initial requirement of 1 ton of lime per acre for the establishment of a pasture. Where 2 tons per acre were applied sampling about 6 months afterward showed free lime in the soil.

Phosphates: Phosphates are essential for the establishment and maintenance of the clovers. At least 3cwt. per acre is necessary, and heavier dressings (up to 5 or 6cwt.) give an extra response and a more vigorous sward in young pasture. Superphosphate and serpentine superphosphate suit the ironstone soil. The area is in a position to be well supplied with lime either from the Pokapu works near Moerewa or from bulk lime piles at Kaikohe and Okaihau. Wet lime distributors operate in the district.

Potash: Volcanic soils are deficient in potash and the deficiency varies in extent. Where potash content is low it is the limiting factor in the maintenance of a good clover pasture, and from trials on Okaihau gravelly friable

Profile of ironstone soil (Okaihau gravelly loam type), showing ironstone pellets.

Paddock grassed down in 1938, showing cages on potash-response trial in background. This paddock adjoins that on which the Department of Agriculture carried out its original trials.

clay on both new and old pasture, supported by farmers' experience, it has been demonstrated that a response from up to 2cwt. of muriate of potash per acre can be obtained and 1cwt. at least is necessary to maintain vigorous clover. Further, where potash is low the application of heavy dressings of lime and phosphate give a small response over a period of years, whereas phosphate and potash give a quick response which is not greatly improved by lime. However, the ironstone country does not consist of a uniform ironstone type, and the better-class volcanic soils, the less-mature Waiotu and Ruatangata types, are often not as potash deficient as the more leached and mature Okaihau soils.

The farmer has two ways of checking the need for potash: He can obtain a soil analysis through the Department of Agriculture and he can carry out a simple trial for himself. Two pounds of muriate of potash applied to an area of 8yds. by 12yds. will approximate 1cwt. of potash per acre. The paddock must be topdressed with phosphate and lime before the potash is applied.

Response of clovers to lime and potash in a trial.

Minor Elements

Trials with a number of minor elements have been carried out on the Okaihau gravelly friable clay and a visible response to molybdenum obtained. However, farmers should not apply molybdenum until they have consulted an officer of the Extension Division about the advisability of using it. Molybdenum is not a substitute for lime, phosphate, or potash and should be applied in addition to these three.

Requirements of Other Soil Types

Reference has been made to soil types in the area other than the three main volcanic ones.

Gleyed or meadow soils (KO, YI): The largest area of this soil type is south and east of Waipapa. It has been formed from basalt alluvium under wet conditions and runs into peat formation in places. This granular soil is grey-black and overlies compact, light grey, granular clay. Although the topsoil is free working, drainage of the subsoil is generally poor. The fertiliser requirements of this type are similar to those of the volcanic soils from which it was derived; they comprise an initial dressing of 1 ton of lime and 3cwt. or more of phosphate per acre. Soil analyses show a potash deficiency on this class of soil and 1cwt. per acre is required as the initial dressing.

Hihi complex (HH): Areas of this soil type are found about 5 miles from Okaihau on the road to Kaeo and again near the junction of this road and the Puketotara Road. This type is a complex derived from volcanic and non-volcanic clay. It is dark grey, similar to the gleyed types, and its manurial requirements are similar, but it appears a little more lime responsive.

Non-volcanic soil types: Important soils of this group within the area are the Wharekohe silt loam (a pipe clay gumland) and the Hukerenui silt (a gumland clay type). Areas of these soils are particularly valuable when farmed with the ironstone soil types. Although less free working, they retain soil moisture and will provide cobalt, which may be lacking in the mature ironstone soil types. Establishment and maintenance of highly productive pastures are possible and follow the methods used on gumland and associated clay soils throughout Northland.

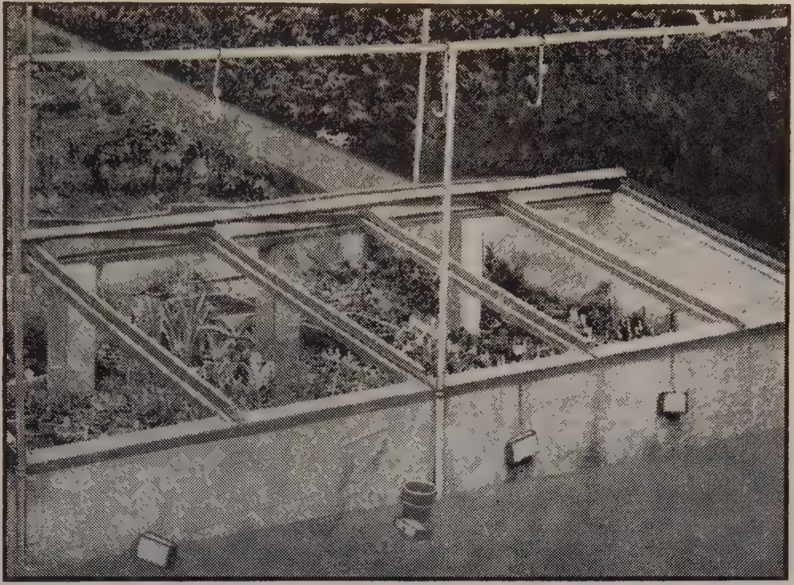
Scope for Development

The ironstone land area gives scope for development and settlement both by the large-scale methods already being used by the Department of Lands and Survey and by individuals possessing the necessary capital. Ironstone country already developed has a carrying capacity of about 2½ ewes and 1/6 cattle beast per acre or a dairy cow to 2½ acres. Cultivation of the land does not present any special problems, and with adequate manuring and careful stocking the fertility of the land can be raised to a satisfactory level.

One dairy farm on the ironstone land carries a cow to 2 acres and produces 150lb. of butterfat per acre.

Construction and Use of Frames and Lights in the Home Garden

FEW if any districts in New Zealand are frost-free and all growing areas are subject to a greater or less degree to cold wind and to temperatures that at times are too low for the satisfactory growth of many of the plants it is desired to grow in the vegetable garden. Many keen home gardeners are interested in extending the growing period of some of their vegetable crops, growing out-of-season crops, or growing crops not completely hardy in their districts. One way of doing this is by the use of garden frames, certain types of which can be made simply and fairly cheaply. Their construction and use are described by A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, in the first part of this article. The section on garden work for August is by S. O. Gillard, Horticultural Instructor, Department of Agriculture, Auckland.



[*Campbell*

Good type of frame built of concrete. In front are the small blocks used in ventilating when the sashes are in place.

GARDEN frames need not be elaborate. The simplest type and one which if placed in a sunny, sheltered situation will give some protection from frost and good results in raising seedlings is made of 4 planks stood on their edges and nailed together to form an open, bottomless square or rectangular box. Stakes or narrow battens are laid across the top to support a cover of scrim or sacking, which is put in place at night when there is danger of excessively low temperature or killing frost. The planks forming the side should be from about 6 to about 15in. wide, the width being governed largely by the crop grown. Small plants, which are readily overshadowed, require only a low wall.

Ideally the frame should face north and be higher at the back than at the front to give a maximum of shelter without restricting light and to facilitate run-off of water from the covering material. The planks forming the sides should preferably be 1in. thick, as thin timber warps more readily. As an alternative to wood the sides can be of other materials, such as bricks or turves cut to the shape and about the size of a brick. A wooden frame has the advantage, important in larger gardens, of being moved easily. Thus even if plants are not raised in boxes, shelter can be given to successive sowings.

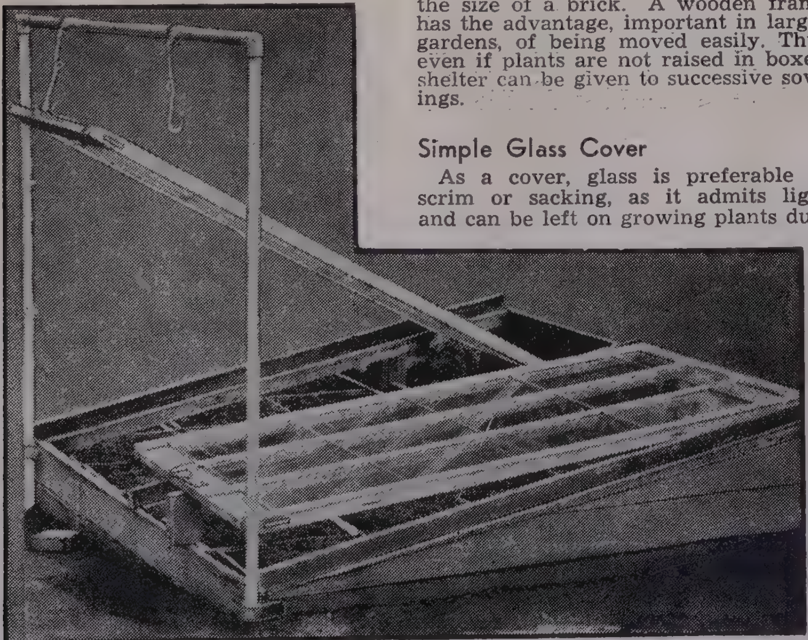
Simple Glass Cover

As a cover, glass is preferable to scrim or sacking, as it admits light and can be left on growing plants during the day. It is more effective than scrim or sacking in excluding draughts and in retaining heat, important considerations in plant raising. Simple glass-covered tops for frames can be assembled even by those without skill in carpentry if light T iron is used to support the sheets of glass, the edges of which are laid in the angles formed by the inverted T iron as shown in the lower diagram on page 66.

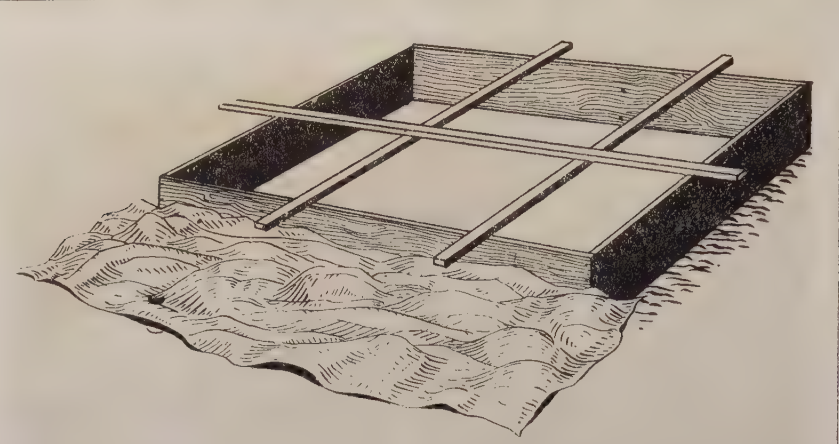
Each sheet of glass is overlapped 1/8 to 3/16in. by the sheet above and held in place by its own weight. The glass is unlikely to shift unless an opening large enough to admit wind is left in the frame or between panes of glass.

The back of the frame should be higher than the front to permit rain and, on the under side, condensed moisture in droplets to drain off. A disadvantage of this loose-glass type of frame compared with one with a movable sash is the difficulty in giving ventilation, which is necessary in raising seedlings when moisture condenses on the under side of the glass.

Where the glass is laid on iron the frame should not slope too steeply or the glass will slide, but in frames lying to the sun the steeper the slope of the glass, up to a very steep angle, the better will be the admission of light. In New Zealand frames are not usually built to very steep angles because the gain through the refraction of light rays at steep angles does not compensate for the added cost of building high-backed frames, and most plants commonly grown in frames in New Zealand do not have exceptionally high light needs, and those (such as tomatoes) which do are not in the frame long enough for any lack of light to affect them adversely.



Garden frames, showing method of ventilation. [*Campbell*



The simplest type of frame. An open, bottomless box made of planks with stakes laid across it to support scrim or sacking, which is drawn back in the daytime. Bricks, turves, or soil could be used in place of timber for the sides.

Late-autumn, winter, and early-spring light conditions, too, are generally better in New Zealand than in many Northern Hemisphere countries where frames, often quite steep ones, are used extensively. In New Zealand an angle of about 10 to 15 degrees is usually considered adequate. The importance of sloping the glass enough to facilitate drainage of moisture which has condensed on the under side of the glass to the extent of forming droplets is often overlooked. Condensed moisture in quantity greatly reduces the light rays passing through the glass and may draw up and weaken small plants such as seedlings.

Light Needs of Plants

Modern conceptions of plant needs differ from those of a few years ago in the stress laid on the admission of as much light to most growing plants as is consistent with reasonable economy in the construction and operation of structures used in propagation. One of the chief developments is the use of larger panes of glass in glasshouses and propagating frames. Sash and glasshouse astragal or sash bars are more widely spaced, resulting in a saving of wood and putty and labour in construction. However, beyond a certain point, the cost of glass rises so that, in New Zealand, the use of the larger panes results in higher initial costs. Whether commercially the higher costs would be offset by subsequent increased returns due to the improved production would depend on the relative value of the crop grown and its light needs.

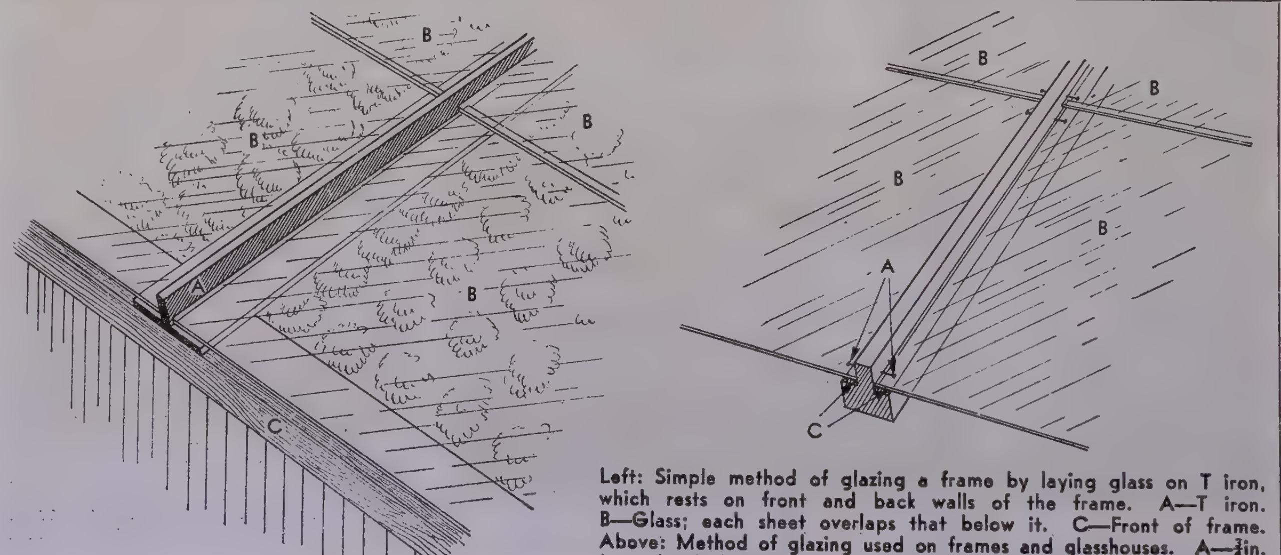
An example of the use of large sheets of glass in a frame or glasshouse is the Dutch light, which is made of a single large sheet of glass (usually about 32in. by 58in.) in a light wooden frame of durable timber, which may be morticed like an ordinary window sash or nailed with galvanised or other non-corroding nails or screws. In Europe Dutch lights are commonly used commercially on garden frames and in the construction of glasshouses.

Apart from the initial cost of the large sheets of glass in Dutch lights an important reason for the continued popularity of the older types of sash is that they are less expensive to repair if glass is broken.

In commercial practice the standard sash is about 6ft. by either 3 or 4ft., usually with three or four rows of panes respectively, though occasionally smaller sashes are used for convenience in handling. The middle photograph on page 67 is of a commonly used type. The lower edges of the bottom sheets of glass overlie the bottom rail so that water drains off. Each successive sheet of glass laid overlaps the sheet below by about ⅛ to 3/16in. Wide overlaps should be avoided as dirt accumulates in the overlaps and restricts light. The top edge of the final or top sheet is let into the top rail so that water falling on it or on the top rail runs down the line of panes, over the wooden rail at the bottom, and off.

An ordinary window sash is useful as a garden frame and one is shown in the upper photograph on page 71. Its main disadvantage is that water on the glass does not shed and this dampness will cause rotting of the timber. For a garden sash the bottom rail should be set under the lowest sheet of glass, there should be no wooden cross-bar, and sheets should overlap so that each sheet from the top downward overlaps the one below it.

Sashes can also be made so that the glass is slid into position in grooves which run up the insides of each of the long side stiles. If of durable timber and used at a fairly steep slope, such sashes do not need putty. Other types are glazed like glasshouses; that is, the putty, which should be soft and easily worked, is first run with a putty knife on each side along the projecting shelf of the sash bar, the glass is pressed firmly on the putty and ¾in. brass brads are driven into the wood, one on each side, about 1in. above the bottom edge of the pane to hold it firmly in position. It is prevented from slipping down by two other tacks, one on each side, previously driven



Left: Simple method of glazing a frame by laying glass on T iron, which rests on front and back walls of the frame. A—T iron. B—Glass; each sheet overlaps that below it. C—Front of frame. Above: Method of glazing used on frames and glasshouses. A—¾in. brass brads holding glass on astragal or sash bar. B—Glass; each sheet overlaps that below it. C—Putty (under glass only).

about ⅛ to 3/16in. from the top of the previously set pane to hold it firm at the top.

The same system of puttying and nailing is carried out on the next pane, which again overlaps the top of its predecessor by about ⅛ to 3/16in. Excess putty is removed parallel to and on the same plane as the top surface of the glass. Contrary to earlier glasshouse practice, the angle in which the edge of the glass lies is not puttied.

Soil

Usually plants grown in frames are specially valued because they are grown out of season. It is important therefore that they should be given as favourable conditions as the physical limitations imposed by aspect and the construction of the frame will allow. One of the most effective ways of creating a favourable environment is by using soil suited to the crop grown. Though satisfactory results may be obtained by using ordinary soil, good results are more likely if the soil mixture is specially prepared. A satisfactory soil for most of the commoner plants is a mixture of 2 parts of clean, turfy loam, 1 part of clean, coarse sand, and 1 part of leaf-mould, rubbed through a ¼- or ⅜in.-mesh sieve. To each bushel (an apple case is a convenient bushel measure) of this soil should be mixed in about 2oz. of superphosphate, 2oz. of blood and bone, and about ¾oz. of sulphate or muriate of potash. If the soil has not recently been limed, about 1oz. of carbonate of lime also should be added. For a seed-bed for very fine seed the top ⅛ to 3/16in. of the mixture should be sieved with an ⅛in. sieve. The soil in the seed boxes should be level or the seed-bed may be damaged by watering.

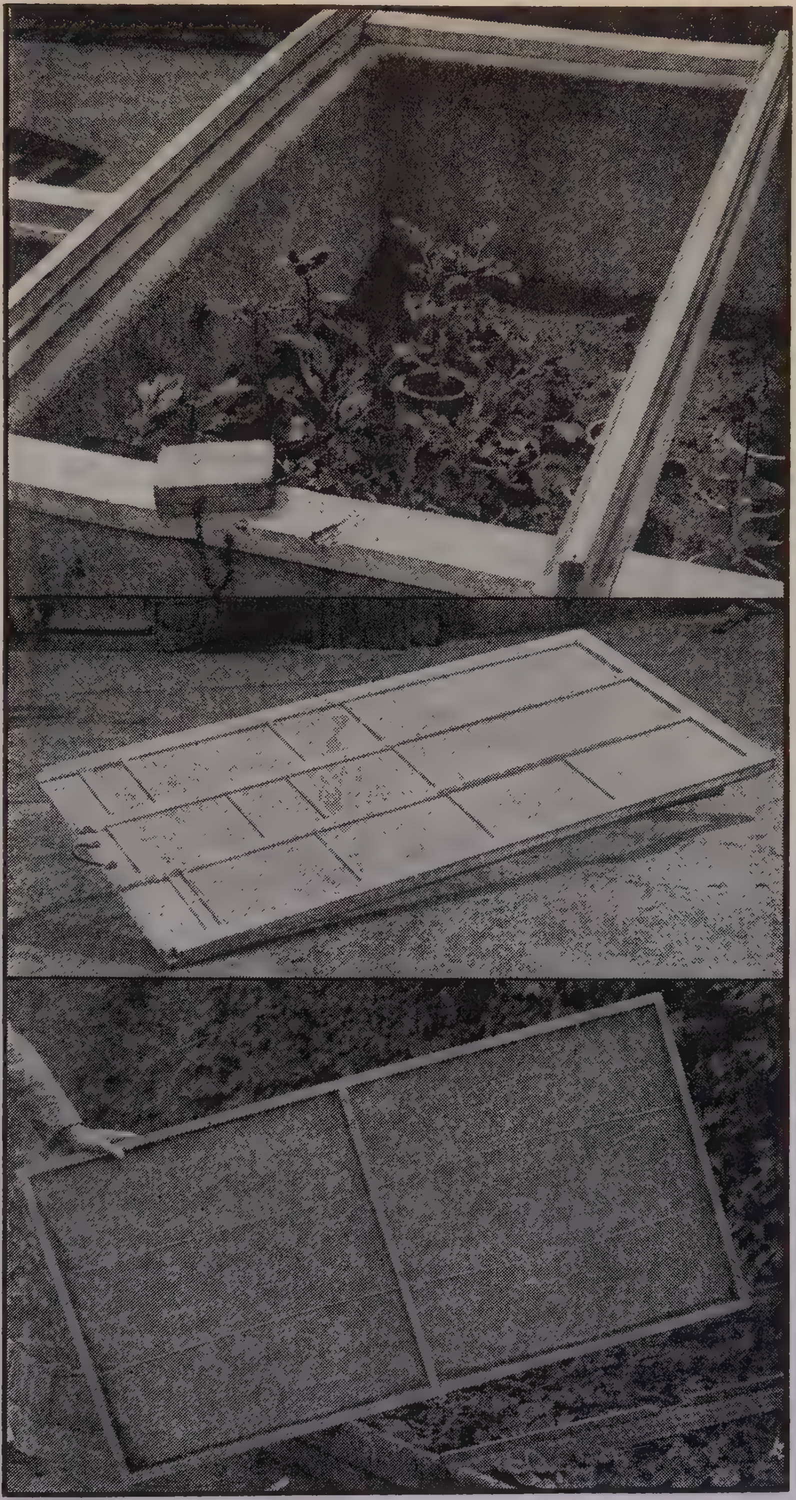
Turfy loam and leaf-mould are not essential; ordinary garden soil and compost can be used, but as they frequently contain many disease organisms which attack seedlings, they should be sterilised before use.

For convenience in handling, plants are best grown in flat boxes placed in frames. The boxes should be of a size that can be handled conveniently and the most commonly used size is about 20in. long by 15in. wide by 2½ to 3½in. deep. Good drainage is essential and special attention is necessary if the plants are grown in the soil of the frame. With boxes either the soil is kept so shallow that water drains readily out the holes or through the slats in the bottom, or a layer of loose, open material (such as rough leaf-mould which is too coarse to go through a coarse sieve) is placed over the drainage holes in the bottom before the soil is put in. For cuttings clean, coarse sand free from dust or clay or a mixture of soil and a high proportion of clean sand is usual.

Usually the frame is shaded or partly shaded and kept sufficiently closed to keep humidity high and reduce moisture loss through transpiration. In this way many types of cuttings can be kept from wilting until they have developed roots. With all propagating operations cleanliness is very important, as many harmful diseases are favoured by high humidity and decaying organic matter.

Seedling Diseases

Even where precautions are taken before planting, seedlings may be attacked by various diseases, which



[Campbell

Upper—Good type of deep frame suitable for fairly tall plants. The block is used to hold up the sash in giving ventilation. Flat it gives a height of 1½in., on its edge 3½in., and on its end 5½in. Middle—Typical sash as used on a garden frame. Broken panes have been replaced with odd sizes of glass. Lower—Light, scrim-covered frame used for covering glazed or unglazed frames to keep out frost or to give shade.

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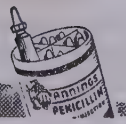
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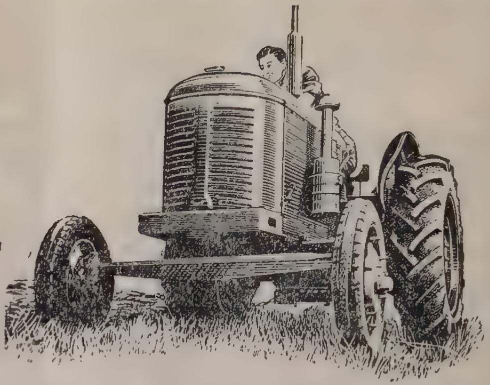

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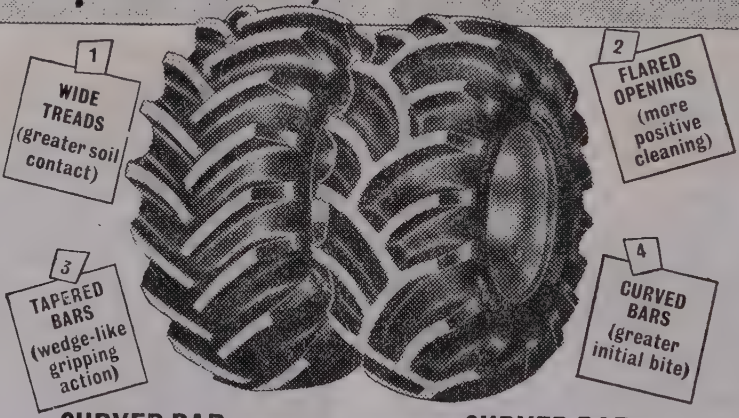
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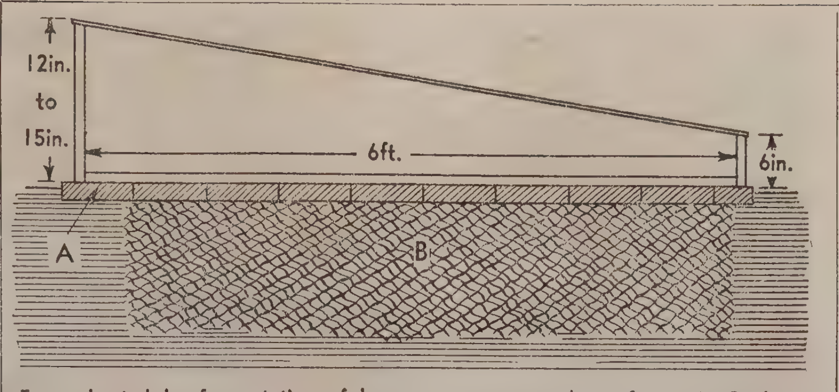
may be soil or water borne, carried over in seed boxes or spread by tools, or transmitted by insect pests. Recent experimental work has shown that one of these diseases, foot rot of tomatoes (*Phytopthora cryptogea* Pethybr. and Laff.), commonly causing serious loss in seedlings can be controlled by use of a proprietary brand of copper oxychloride at 1 or 2 per cent., and that the more commonly used fungicidal substances, formalin at 0.25 per cent. (1 : 400) and Cheshunt compound at 1 per cent. also gave satisfactory control without injury to seedlings. It is likely therefore that any of the above materials at the strengths given would be effective in the control of most of the other minor fungous diseases which attack seedlings. Several other fungicidal substances tested by the research workers gave control but damaged the seedlings.

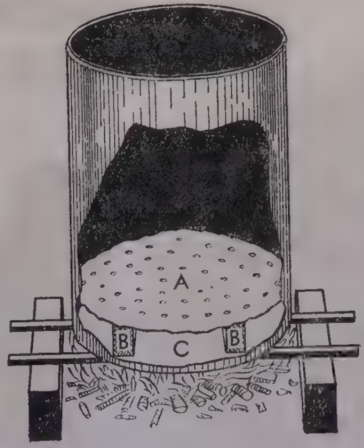


Frame heated by fermentation of horse manure or garden refuse. A—Bricks on which wooden frame rests. B—Fermenting matter.

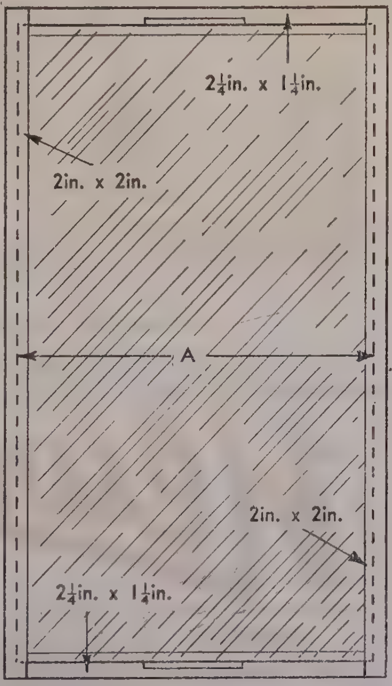
Soil Sterilisation

Most garden soils that have been cropped consistently for some years contain many disease organisms harmful to seedlings and for that reason it is advisable to disinfect or partly sterilise such soils when they are used for raising seedlings. This can be done with steam or chemicals. Small quantities can be steamed in a sack suspended over a little water in a wash boiler with the lid on, or in the open by using a drum such as a 5-gallon oil drum. The oil drum should have the top cut out and then be burnt out to remove the oil. Two half bricks or blocks of wood should then be put in the bottom and covered with water and the cut-out top dropped on them. The drum should then be filled above the dropped-in top with loose soil and placed over a fire. When the soil at the top of the drum is much too hot for the hand most harmful disease organisms should be destroyed, but to be on the safe side it is usually best to maintain the fire for a further 10 minutes before removing the soil.

Alternatively the soil can be treated with formalin or chloropicrin. Formalin is used at 1 gallon to 49 gallons of water, and 50 gallons of the mixture should be sufficient to treat about 1½ tons of soil. The soil, which should be free from lumps, should be spread in a layer 6in. deep, watered with the solution, and either covered with wet sacks or with another layer of the soil to be treated. When the heap is high enough, usually 2 to 3ft., it should be sprayed with water, covered with wet sacking, and left for 2 to 4 weeks, after which it should be turned to dissipate the fumes. As formalin will damage plants, the fumes must be completely dissipated before the soil is used. Treated soil should be dug over a number of times (fine, loose soil less frequently than heavier soils) until all trace of formalin smell has gone. This may take as long as 6 weeks.



A container for sterilising soil can be made from a 5-gallon drum. The top should be covered with a lid or wet sacking to retain heat and prevent loss of too much steam. A—Cut-out top of drum, in which small holes are punched to facilitate entry of steam into soil. B—Bricks. C—Water. Soil is placed on A.



Dutch light. A—Glass 32in. x 58in. and not lighter than 21oz.

Chloropicrin, a tear gas, can be used, but owing to the risk of irritation to the hands, eyes, or lungs or more serious effects, it is not recommended to home gardeners. Experience in handling, the use of a suitable gun for injecting, and a good gas mask are essential for safe use.

Methods of Heating Frames

Well-built frames in favourable sites should, under proper management, retain sufficient heat overnight to ensure that night and day temperature variations are not great, but in frosty weather it is usually necessary to close frames in the afternoon before the direct sun heat is gone, and in the colder districts that is usually at least an hour before sundown. In addition where very heavy frosts are expected the glass should be covered with sacking or scrim.

Animal Manures or Refuse

Where there is insufficient sun heat for good growth it may be necessary to provide artificial heat. One of the simplest and cheapest ways is to put in the bottom of the frame a layer of material such as horse, fowl, pig, or other animal manure, spent hops, or rubbish which will create heat while decomposing, such as that used to make compost. Horse manure, provided it does not contain too much straw, is one of the best materials, as its behaviour is more predictable than that of most of the other substances. It should be moist without being wet and should be turned at least twice at intervals of about 3 or 4 days to ensure that bacterial action throughout is uniform. It can then be placed in the frame, where it should be firmed gently. If it is beaten down with the back of the fork used to turn it, consolidation should be adequate.

If garden trash and similar mixed materials are used, the general principles governing the making of a compost heap should be followed. Soft, green, nitrogenous materials or animal manure without too much litter should be mixed or layered with wet, fibrous material. A sprinkling of lime should be added every few inches, as bacterial activity will be greatly reduced if conditions are too acid. Moisture is essential, but the heap should not become too wet, particularly if of material which readily becomes soggy. Excessive firming of material which tends to consolidate should be avoided and additional ventilation should be given by making holes with the handle of a rake or similar tool about 10 to 15in. apart down into the heap.

The depth of the layer of fermentable material placed in a frame

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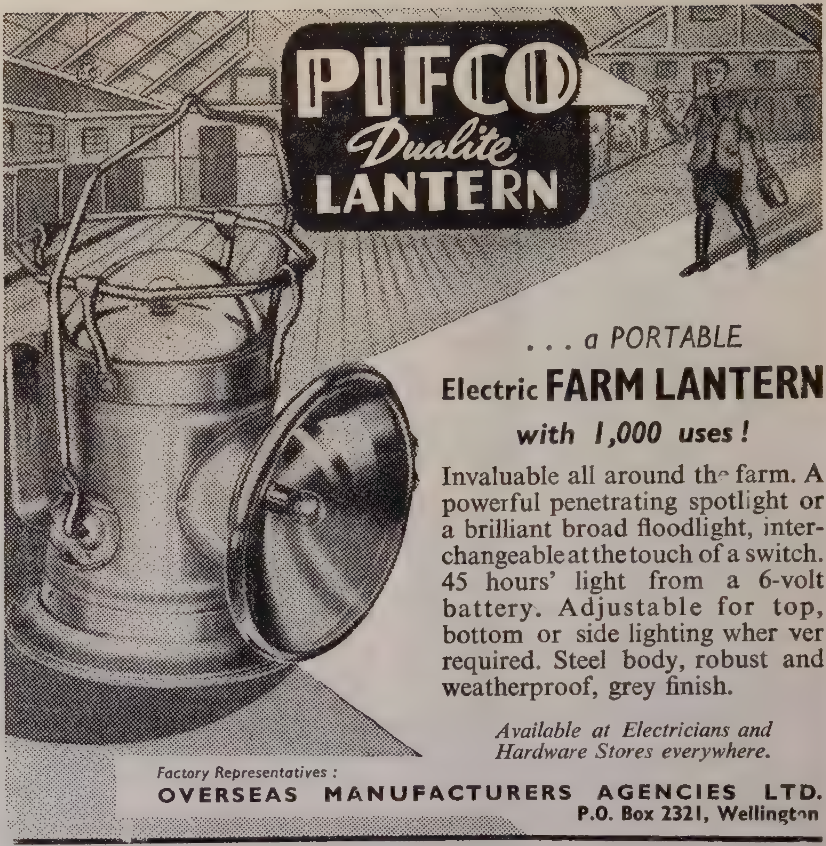

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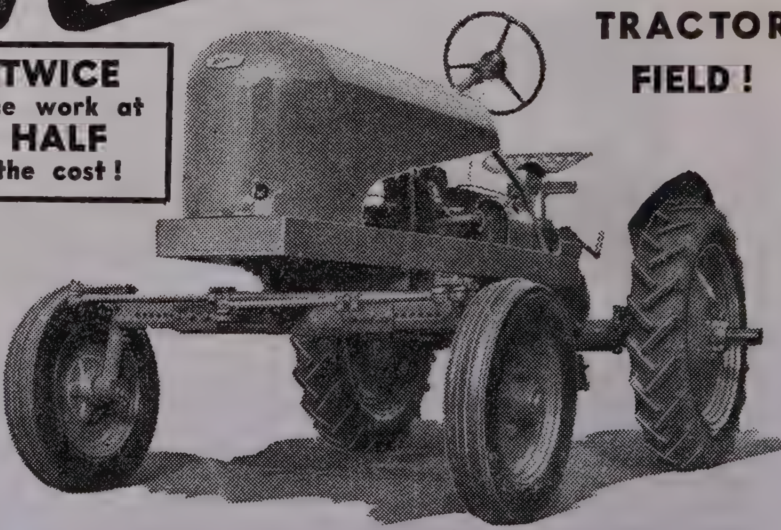

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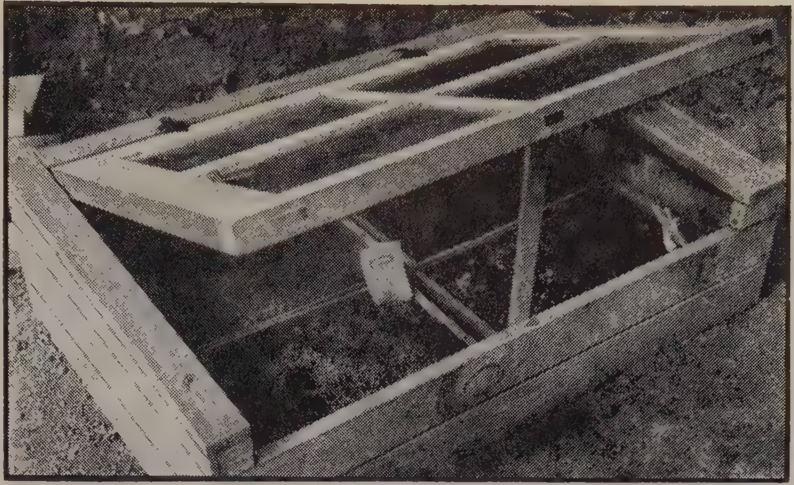


[R. W. Orr

A window sash is useful as a frame top, but as it does not shed water, the woodwork is likely to rot fairly quickly.

depends on its composition. Readily fermentable material such as horse manure or spent hops need be only about 6in. deep, though deeper beds usually retain heat longer. Garden trash should be at least 24in. deep and properly layered.

A layer of soil should be put on top of the fermentable material. It need be only 1in. deep if the plants are to be grown in boxes, but if plants are to be grown in the soil of the frame, it should be deep enough for root action and should not dry out or be overheated; 6in. is usually about the best depth.

Fuel Heaters or Electricity

As an alternative to heating by fermentation frames can be heated by oil- or kerosene-burning heaters or by low-tension electric cables. There are a number of heaters on the market which are capable of heating frames or small glasshouses. The number of cubic feet of air space a heater is capable of heating is usually given by the maker or if the output in British thermal units is known, the space it is capable of heating can be determined.

The larger heaters should be fitted with a chimney or flue to allow fumes to escape, and care is necessary, particularly where there is no escape pipe or flue, to ensure that combustion is complete, as fumes, particularly those of partly volatised oils, can be very damaging to the foliage of plants such as tomatoes.

Choice of a heating system should be governed by the lowest outside temperatures likely to be experienced, the inside temperatures needed, the loss of heat through a glazed structure (which is much greater than that of a structure of wood, brick, or similar material), and the heat output of the heating unit.

For heating by low-tension electric cables a transformer is necessary for the reduction of the voltage from 230 to 12 and the heat is applied through a galvanised-iron wire circuit, which is usually placed from about 1 to 6in. deep in the soil. If plants are grown in boxes placed on the soil, 1in. of soil may be sufficient, but if they are grown in the soil, they need a much deeper root range; 6in. has been found satisfactory for a great range of plants propagated in electrically heated beds, though slightly shallower soil is satisfactory for some subjects if watering is done carefully and the heat is kept low.

A soil thermostat should be installed through the side of the frame about 1½in. above the level of the wire and the soil can thus be maintained at the desired temperature, which is about 60 to 65 degrees F. for most propagating work. The area of the soil to be warmed will determine the capacity of the transformer required and the gauge and length of the wire circuit. When warming is thermostatically controlled about 6 watts to each square foot of soil is sufficient.

The amount of power used by a small unit is small and owing to the low voltage used there is no danger to the operator, but because of restrictions on electricity, permission to install may not readily be granted by electrical authorities.

For those interested, fuller details of electrical soil heating may be obtained from the Storage Specialist, Department of Agriculture, Wellington.

A type of frame not often seen. Built like a miniature glasshouse, it has some advantages of a glasshouse together with those of a frame. It can be heated readily with a kerosene- or oil-burning heater.

Preservative Treatment of Timber

Durable timber is rarely available for seed boxes or frames and to extend the life of the wood used in construction it is advisable to apply some form of preservative. Oil-soluble wood preservatives such as zinc naphthenate (2 per cent. metal by weight), copper naphthenate (1 per cent. metal by weight), and 5 per cent. pentachlorphenol are available as proprietary lines and, applied with simple brush treatments, are effective in prolonging the life of wood used in the garden. The degree of protection is governed largely by absorptions and penetrations; 20-minute dip or soak treatments are superior to brush treatments.

Timber should be seasoned and fully manufactured, as dressing or cutting subsequent to treating may expose untreated surfaces. In addition treatments of aqueous solutions of Wolman salts, which give complete penetration, are available from some timber merchants. The timber should be painted afterward if long-lasting protection is required, or there may be some loss in effectiveness owing to leaching.

Coal-tar creosote is an effective wood preservative, but may damage plants, as, under certain circumstances, treated wood may give off damaging fumes for many months.

Work for August

In most districts August is regarded as the first month of the new gardening year, but there should still be no urgency to sow or plant extensively. Operations should be governed by the state of the soil and the weather. Green crops should be dug under, as a heavy green crop takes some time to rot down after being turned in. The value of lupins as a green crop has long been recognised, but to obtain full benefit from them digging in should not begin until there is considerable development of nodules on the roots.

Vacant areas should be dug over and dressed with lime if not already limed this year. Average New Zealand soils require an annual application of ¼lb. a square yard of carbonate of lime for vegetable growing.

All growing crops should be hoed frequently to aerate the soil and to prevent weeds from growing. Crops of cabbages and cauliflowers should be kept mounded up to maintain the ridges they were planted on. Peas if supported with small sticks or with string stretched along each side of the row will not only crop more heavily but will be of better quality and will be less likely to be eaten by birds.

In a well-planned garden a considerable area of ground should have been dug or trenched in autumn or winter and left rough. The first thing to be done before sowing in spring is to fork over the top spit and break it down thoroughly. Light soils require only a shallow forking, as they readily crumble to a fine tilth if they are in condition for sowing. With heavy soils sods may need breaking up with the back of the fork.

Firming and Raking

The soil should be firmed before sowing or planting is done. Soils that are heavy or only just dry enough must not be firmed too much; hitting the earth with the back of the spade is sometimes sufficient. Soil that is in the best condition for sowing should be firmed by walking along the rows with a shuffling motion.

The final work required to be done on the seed-bed is to remove lumps, stones, or rubbish and to level the soil and to reduce it to the finest tilth possible by raking it with a fine-toothed garden rake.

The most convenient tool for making seed drills is an ordinary swan-neck hoe. To draw a narrow, deep drill the blade may be tilted and only a corner used. If a wide, flat drill is required, the broad edge should be used. For very shallow drills the back of a rake pressed into the soil is sufficient. The maintenance of correct, even depth is very important, because variations are likely to cause irregularity of germination, which will make thinning difficult or result in blank spaces in the rows.

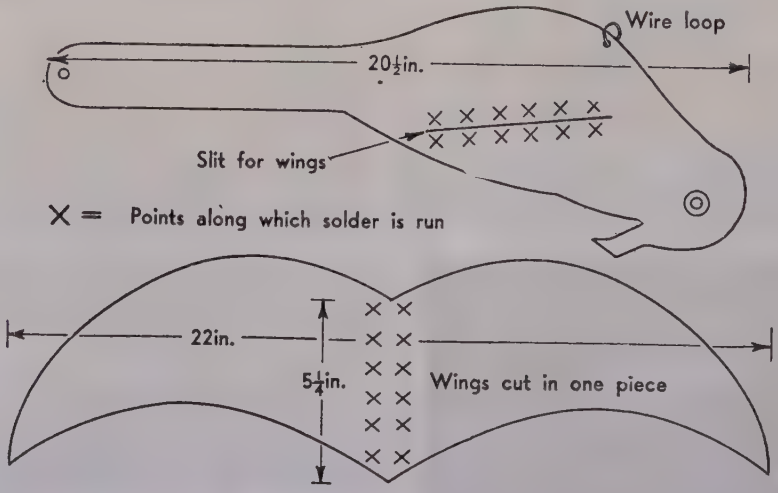
Sowings

The advice on the seed packet regarding the depth to sow is only a guide. In very light soils seeds may be sown a little deeper than recommended and in damp or heavy soils a little shallower. Most seeds of good quality have a high germinating capacity and should be sown thinly and evenly.

Peas can now be sown in all except very cold districts such as South Otago, where sowings are best delayed until the end of August or early September. Among the varieties suitable for early sowings are William Massey and Little Marvel.

New Type of Bird Scarer

MODELS of a new type of bird scarer devised by Mr. H. G. Perks, a gardener of North-east Valley, Dunedin, have been kept under constant observation during the past season by officers of the Department of Agriculture to ascertain their efficacy in keeping birds off vegetable and other gardens.



The models were cut from an opened-out petrol tin and were shaped to represent a hawk in flight. They are 20½in. long with a 22in. wing span and are painted with dark brown varnish. Each scarer has a wire ring on the top centre of the body for attaching it to a pole or wire. Because of the thinness of the tin used, the scarers reverberate with a faint "thundering" noise in the wind.

Observation has shown that they are most effective in windy weather, when the vibration of the wings makes them realistic, but the birds become used to them and in calm weather will feed quite close to them. A prominent strawberry grower in the Dunedin district who co-operated with the Department in testing the bird scarers considers that they are the best of their type, but that there is nothing to equal a gun for keeping birds off gardens.

Potatoes: A first-early planting may be made in sheltered, frost-free areas in the North Island. Popular varieties for early planting are Arran Banner and Epicure.

Parsnips may be sown in the North Island in all except fairly cold districts. A good variety is Hollow Crown

Beetroot, carrots, turnips: Small sowings may be made in most districts, provided soil conditions are favourable. Good varieties are:—

Beetroot: Crimson Globe, Detroit Red.

Carrot: Early Krop, Early Horn, Chantenay.

Turnip: White Stone.

The following may be sown in cool frames or boxes with a glass covering for planting out later:—

Lettuce: Imperial 615 or Neapolitan.

Cabbage: Golden Acre, Enfield Market, and Copenhagen Market.

Tomatoes (all districts): Dwarf, Adelaide Dwarf, Early Chatham. Tall: Potentate, Moneymaker, or Carter's Sunrise.

Radish, spinach, and spring onions (sheltered, sunny positions): Radish: French Breakfast, White Icicle. Spinach: A prickly-seeded (winter) variety. Spring onion: White Lisbon.

Plantings

Cauliflower can still be planted in Auckland and Northland. Suitable varieties are Early London and Phenomenal Early.

Cabbage may be planted in favoured localities. Recommended varieties are Golden Acre, Enfield Market, and Henderson's Succession.

Shallots: Now is the best time to plant shallots. Bulbs should be broken into the small natural division (cloves) and these pressed 1in. into the ground in drills 8in. apart.

Onions for a main-crop for storing can be planted. A good keeping variety is Pukekohe Long Keeper.

Asparagus and rhubarb: One- or two-year-old crowns should be set out without further delay. Good varieties of asparagus are Paradise and Mary Washington, and of rhubarb Victoria Giant, Champion, and Topps Winter; the last will produce stalks all the year round, but is especially adapted to winter production. Many varieties are dormant in winter if the weather is fairly severe.

Kumaras are grown mainly in warmer, relatively frost-free parts of the North Island. They may be raised in a box during August or early September. The box should be about 9in. deep and a convenient width and length and filled with equal parts of good soil and sand. The tubers are set about 3in. deep and should be kept moist. The necessary soil warmth to promote growth may be induced by placing the filled box in a sunny position and covering it with a sheet of glass. The tubers shoot from the eyes and as soon as the shoots have developed small roots the shoots should be removed and planted in their permanent position or replanted into another box until required. If plants are removed early, another batch of plants will soon appear; 6 to 12 medium-sized tubers will supply enough plants for the average home garden.

Recent Research Work

Heading photograph by National Publicity Studios.

HILL-COUNTRY PASTURES

THE improvement of grazing pastures of hill country in higher-rainfall districts depends primarily on the pasture species present, particularly the clovers, the soil fertility, and the management of the sward. Soil-fertility investigations in hill country have received new importance with the rapid increase in aerial topdressing and consequently the means whereby the findings of fertiliser investigations can be translated into farming practice. The large numbers of trials of this type on hill country are giving results of more direct application than was at first thought possible.

TUSSOCK COUNTRY WORK has been continued over the last year in the tussock and depleted country of the South Island, and approximately 20 trials are in progress. It has been found that legumes can often be established, particularly if the fertility is raised by topdressing, on all but the most arid and depleted country. Legumes appear to establish best in the shelter of tussock, with the aid of spelling and topdressing with superphosphate, but, if necessary, they can often be introduced without spelling. The most productive legumes are lucerne, alsike, and broad red clover, and, when fertility has been increased, white clover. Subterranean clover is also useful, the Tallarook variety being better than Mt. Barker. Several trials have investigated the possibilities of using zig-zag clover, but the usefulness of this species has not yet been determined. The grasses which are most successful in these conditions are cocksfoot and tall oat grass, but tall fescue, sweet vernal, *Phalaris tuberosa*, and crested dogstail are quite promising. Of the native grasses blue wheat grass and plume grass are very good. All grasses seem to establish best in the open. Of other species yarrow and sheep's burnet are valuable. The establishment of both grasses and legumes is aided by topdressing and protection from rabbits. Several seed-production trials were laid down last year to obtain bulk supplies of seed for tussock grassland investigations, and grazing and palatability trials are also being carried out.

LEGUMES The introduction of legumes with phosphate is the first step to improvement on many clover-deficient swards and subterranean clover is apparently the most suitable clover for this initial stage, more especially on soils subject to drying out in summer. Tallarook subterranean clover has been found in most cases to be more persistent than Mt. Barker. A possible explanation lies in the fact that the Tallarook strain, being later to come into full leaf production than Mt. Barker, is not so severely defoliated by grazing, as there is usually more alternative feed available at that time. It is also more prostrate in growth habit and this gives some protection from over-grazing. On the moister, more fertile soils white clover is the more productive plant, though subterranean clover is often better in the initial stages of fertility building, as its fertility requirements appear to be lower than those of white clover. In high-rainfall districts or on shady slopes *Lotus major* is a most valuable legume. Red clover, especially Montgomery red clover, has been successfully introduced in a number of trials. It seems to do better on shady slopes, but is often not as persistent as the other legumes mentioned. Trial results indicate that in most districts better establishment of Montgomery red clover and subterranean clover is obtained by autumn sowing, though a better initial strike may be secured in spring. In all cases, especially with subterranean clover, the summer grazing management in the first year after sowing must be sufficiently lax to allow reseeding.

SEED-BED Comparisons of different types of seed-bed preparation indicate that although establishment is better with surface cultivation, it is quite possible to obtain good clover swards without the aid of cultivation. The best type of sward on which to oversow appears to differ in different localities. On soils subject to severe drying out or wind erosion some surface litter is almost essential, but on the other hand establishment is usually poor on close turfs where it is difficult for the sown seed to reach the soil surface and where young germinating seedlings are subject to severe competition from established plants. The number of failures from trial oversowings is a disturbing feature. Some of these can, perhaps, be attributed to stock concentration on the trial area to the detriment of establishing plants, but there is definite evidence that much mortality of young seedlings is caused by birds, various insects, and slugs.

PELLETING CLOVER SEED Over the past 4 years a large number of field trials has been laid down in various districts to investigate the effect of pelleting clover seed with fertiliser and other substances. Pelleting aims primarily at benefiting the seedling or established plant by placing fertiliser in the immediate vicinity of the seed at the time of sowing, in which position it should do the most good. It seems reasonable to hope that if the fertiliser is so placed, a smaller quantity would give a result similar to a broadcast application at the usual rate. However, the results of most of the trials show that use of the types of pellets developed to date does not show any advantage over the broadcasting of seed and fertiliser at the usual rates.

—F. H. THORNTON and S. MACLEAN

* * * *

FERTILISERS THE rate at which superphosphate should be applied to improve hill country which has received little or no phosphatic topdressing is also being studied. A few trials of this type have been recently laid down in the South Island to study rates of application of double superphosphate applied by aeroplane. In the North Island superphosphate or serpentine superphosphate at 3 to 4cwt. per acre has proved superior to lighter rates of application. In most cases good lime responses have also been obtained and a new series of trials incorporates comparisons of rates of lime as well as kinds of phosphates.

Many trace element trials are giving particularly important results on hill country, much of which is responding to a few ounces of molybdenum per acre (a practical and economic dressing in association with phosphatic fertiliser) on land which it was previously thought needed heavy lime dressings which were quite impracticable to apply. It is important to stress, however, that the basic need for practically all hill country is phosphatic fertiliser, and molybdenum is no substitute for phosphates.

—P. B. LYNCH

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Leaf-mining Pests in New Zealand

By K. J. WISE, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

IMMATURE stages of certain insects are responsible for a type of plant damage known as leaf mines. A mine is made by a larva living within and feeding on leaf tissues. In New Zealand there are more than 30 species of native leaf-mining insects, although only two, both flies, can be regarded as pests. Of three introduced mining pests one is a fly and two are moths.

THE eggs of most mining flies are laid separately, each in a puncture in the leaf, and maggots after emergence start eating directly into the tissue. Leaf-mining moths, however, lay eggs on leaf surfaces and young caterpillars must bore into a leaf before beginning to feed. Leaf mining takes place during the immature or feeding and growing phase. When larvae have reached full size they become sluggish and change into pupae, from which adult flies or moths eventually emerge.

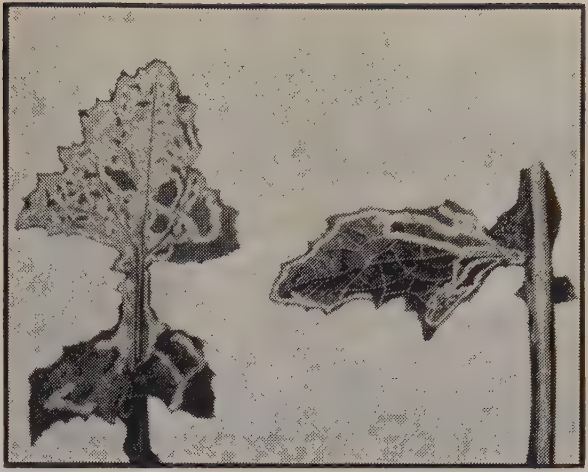

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Fig. 1—Linear mines of the cineraria leaf miner in sow-thistle.

Leaf Mines

Insect leaf mines are of two main types, linear and blotch. They can be seen as pale lines or areas on either upper or lower leaf surfaces. A linear mine is formed when a larva tunnels progressively as it eats through the tissues; a blotch mine is formed by a comparatively stationary larva which eats in all directions. The type of mine is characteristic of the species. Some species of leaf miner produce only linear mines; others produce only blotch mines, and a few species produce both types.

Species of Leaf-mining Pests

Leaf-mining pests in New Zealand are described below:—

Cineraria leaf miner (*Phytomyza atricornis* Mg.): The commonest leaf miner in New Zealand is the well-known cineraria leaf-mining fly. It is of European origin and is almost world wide in distribution.

Habits: Eggs are laid singly in punctures mainly in the upper leaf surface. The larvae generally feed in the upper layers of the leaf, forming a linear mine (Fig. 1), but they burrow against the lower cuticle before pupating within the mine.

Host plants: Cineraria, chrysanthemum, marigold, pea, dahlia, sow-thistle, dandelion, nettle, capeweed, ragwort, groundsel, and Scotch thistle.

Beet fly (*Haplomyza chenopodi* Watt): This native species is occasionally a pest in vegetable gardens.

Habits: The eggs are laid singly in leaf punctures. The larva forms a linear mine (Fig. 2), which it leaves when fully grown, pupating on the soil beneath the food plant.

Host plants: Silver beet, spinach, mouse-eared chickweed, common chickweed, and fat-hen.

Clianthus fly (*Agromyza clianthi* Watt): A common and well-known example of leaf-mining damage in gardens is the mine of the native clianthus fly. Red kowhai is attacked so severely by this species that it is most difficult to grow in some areas.

Habits: Eggs are laid in pockets on the under sides of leaves. Larvae make linear mines (Fig. 3) through the upper layers of leaves they occupy. When ready to pupate they leave their tunnels and move to vegetation near ground level.

Host plant: Red kowhai.

Oak blotch miner (*Lithocolletis messaniella* Zell.): Damage caused by this moth was first reported in New Zealand in February 1951, when infested oak leaves were found in Gisborne.* This species has been recorded in England, Europe, Asia Minor, and North Africa.

Habits: Yellowish eggs are laid separately on the under sides of leaves. The larva forms an oval blotch mine (Fig. 4) within which it eventually pupates.

Host plants: The only host plants recorded overseas are common oak, holm or holly oak, hornbeam, Spanish chestnut, and holly. In New Zealand, however, the host range is apparently greatly extended. The list given has been compiled from specimens collected in Hastings district. Some specimens have been identified only from the damage, moths not having been reared from all of them. There is nothing to suggest, however, that more than one species is concerned. The New Zealand hosts are: Six species of oaks, three introduced and two New Zealand beeches, American and Spanish chestnut, horse chestnut, European white birch, hornbeam, ironwood (*Parrotia persica*), and liquidambar.

Azalea leaf-miner (*Gracillaria azaleella* Brants.): Although not reported until 1952, this species is apparently not a recent introduction, as damage to azaleas appears to have been known for some years. A native of Japan, it has spread throughout North America, England, and Europe, being a pest in greenhouses.

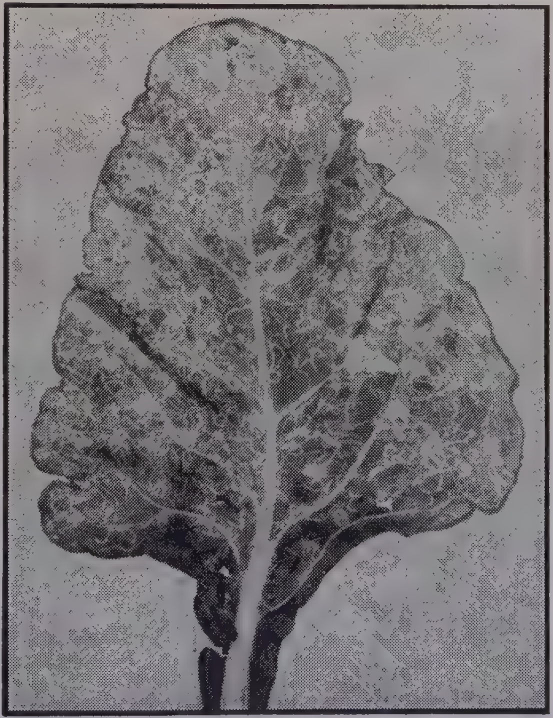

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Fig. 2—Linear mines of the beet fly in silver beet.

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* Recorded by Wise "Occurrence of the Oak Blotch Miner *Lithocolletis messaniella* Zeller (Lep: Grac.) in New Zealand", Trans. Proc. Roy. Soc. N.Z. (Paper in press.)

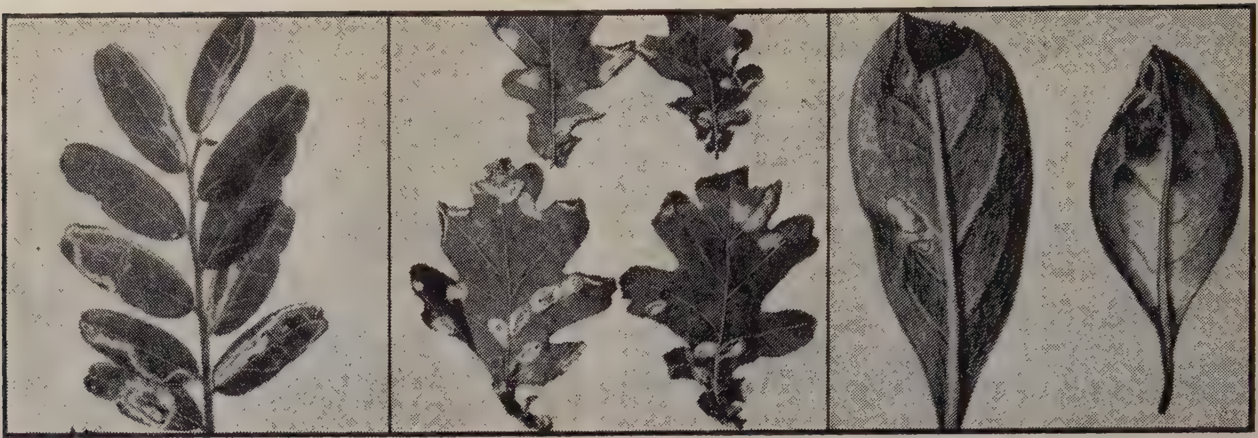

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Fig. 3 (left)—Linear mines of the clianthus leaf miner in red kowhai. Fig. 4 (middle)—Blotch mines of the oak blotch miner in oak. Fig. 5 (right)—Linear mines, rolled leaf tip, and pupal chamber of the azalea leaf miner in azalea.

Habits: Four or five eggs are laid singly on the under side of a leaf. The larva makes a linear mine (Fig. 5), which it leaves before it is half-grown. It then rolls a leaf edge or tip (Fig. 5) over the under side of a leaf and lives and feeds in the cell so formed. A larva may make two or three of these cells before pupating and may pupate either in a cell or in an irregularity in a leaf (Fig. 5).

Host plants: Overseas this miner is found on azaleas and rhododendrons, but in New Zealand to date it has been recorded only on azaleas.

The control of leaf-mining pests is generally difficult, as the insects are protected for a major part of their life cycles by the leaves they are attacking. A spray must either penetrate the leaves to kill the young insects in the mines or the insects must be attacked when they leave the mines during a later stage of their life cycles. It is difficult to find a spray which will penetrate leaves in sufficient quantity to kill the insects but not damage the plant. To kill the insects after emergence from the mines it would be necessary to know the life history in detail and then attempt to find a spray that would be effective in killing the insects at some unprotected stage.

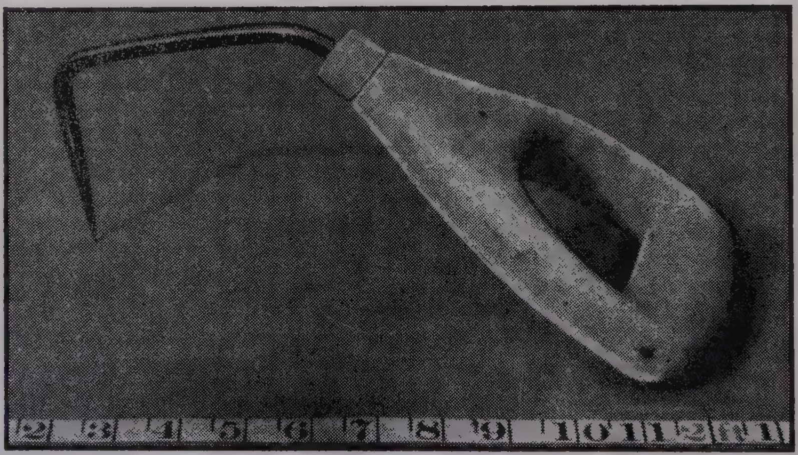
Work is still needed to determine adequate control measures for all the miners discussed, but overseas work suggests that the following sprays used regularly will give some control of most of them:—

1. Nicotine sulphate 1 : 400 plus soft soap, ½oz. per gallon of water.

   or

2. An ounce of 50 per cent. D.D.T. wettable powder in 6 gallons of water. To give a stronger contact action 1½ fl. oz. of H.E.T.P. (hexa ethyl tetraphosphate) may be added, but it must be remembered that H.E.T.P. damages certain plants (for example, chrysanthemum) and should be tested in small amounts before general spraying. D.D.T. sprays should not be applied within 21 days of harvest to any plant grown for human consumption and they are not recommended for use on silver beet or spinach at any time.

Hook for Baled Hay



THE hay-bale hook illustrated was designed and made by dairy farmer Norman Douglas of Waiuku. With its use the blisters usually raised in handling bales of hay with a sack hook during harvesting may be avoided. When a carrier who handles many thousands of bales each season saw the new hook he wanted to try it out and was instantly convinced of its superiority and had one made for himself. Now nothing would induce him to use a T-shaped sack hook.

Mr. Douglas made the hook illustrated from an old spade handle and the prong of a broken hayrake.

—*M.H.*

Growing Grapes in the Home Garden

The fundamentals of grape growing are probably less well known by home gardeners in New Zealand than are details of the culture of stone, pip, citrus, and berry fruits. Perhaps the belief that few localities are favourable for grapes accounts for this, but with correct treatment vines of a suitable variety should succeed in many parts of New Zealand.

Bulletin No. 291, "Grape Growing in the Home Garden", which has just been published by the Department of Agriculture, contains all the information which should be needed by home gardeners. Copies are available free from any office of the Department. For those who may wish to study the subject in more detail, particularly with reference to the vintage properties of different varieties of grapes, Bulletin No. 354, "Viticulture", is recommended. It can be obtained at 2s. 6d. from main offices of the Department.

Puddings that Can be Made Quickly

ON a farm, especially where one's own meat is killed, the first course of dinner is usually dictated by what parts of the last carcass are left in the safe, but the pudding course nearly always has to be chosen afresh every day. In this article by Eirene E. Unwin, Field Officer in Rural Sociology, Department of Agriculture, Christchurch, recipes are given for a number of puddings which can be made in a hurry—if the meal time has nearly been reached and for some reason or other a decision on what to have for pudding has not been made earlier.

CERTAIN small steamed puddings can be cooked in ½ hour—not much longer than the time it takes to dish, serve, and eat the first course. If a larger quantity is needed it would be best to cook the mixture in two bowls, if urgency is important, though steaming a double mixture in one bowl would not need double the cooking time stated.

Steamed Puddings

Half-hour Steamed Pudding

1½ cups of flour
1 tablespoon of sugar
2 heaped teaspoons of baking powder
A little milk

Mix these together into a very stiff dough and put the mixture into a well-greased basin. Pour over the dough a mixture of ¼ cup of sugar, 1 teaspoon of butter, and 1 tablespoon of golden syrup or honey dissolved in 1 cup of boiling water.

Stand the bowl in a saucepan with boiling water more than half-way up the sides of the bowl. Do not cover the bowl, but put a lid on the saucepan. Steam the pudding for ½ hour, keeping the water boiling all the time. Do not use too small a bowl, as the pudding rises a lot.

Chocolate Steamed Pudding

1 cup of flour or ½ cup of flour and ½ cup of wholemeal
1 teaspoon of baking soda
½ cup of dates or sultanas
2 teaspoons of cream of tartar
2 dessertspoons of cocoa
Milk to make a soft dough

Above—Smile girl smile pudding, a scone mixture and golden syrup pudding that takes ½ hour to bake. At left—Marshmallow, a foamy gelatine dessert that sets almost while it is being made, served with stewed plums.

Mix these together and put the dough into a greased bowl. Pour over it 2 teaspoons of golden syrup, ¼ cup of sugar, 2oz. of butter, and 1 small cup of boiling water.

Steam the pudding for ½ hour with the lid on the saucepan, but no cover on the basin.

Tangerine Pudding (1 hour to steam)

4oz. of flour
2oz. of sugar
2oz. of butter (or soft fat with butter essence)
½ cup of milk
1 teaspoon of baking powder
1 egg
Syrup, jam, or marmalade (about 1 small cup)

Grease a bowl and quarter fill it with the syrup or jam (marmalade is particularly nice). Beat the butter and sugar, add the egg, beat well, and add the milk and last the flour and baking powder. Pour the mixture on top of the syrup or jam and steam it for 1 hour with a lid on the saucepan, but no cover on the basin.

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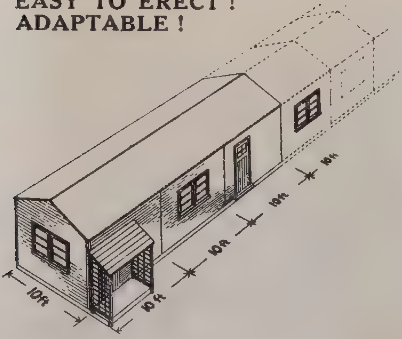

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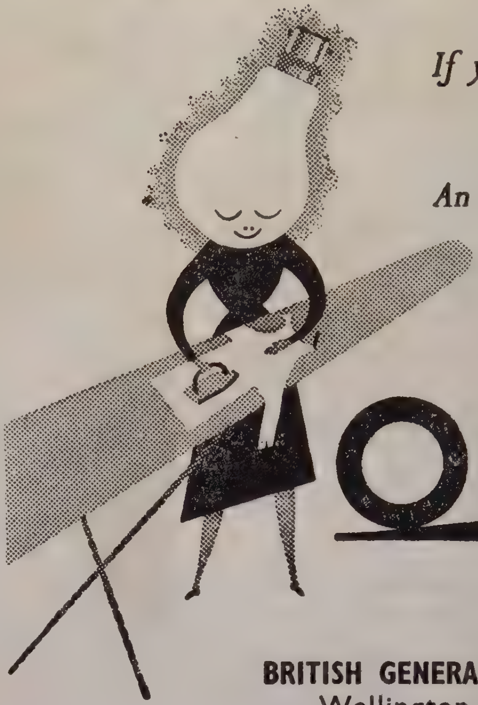

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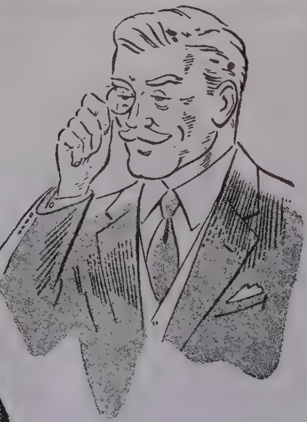

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One of the many varieties of quickly made, cheap, fruit and stale bread puddings: Cheap apple charlotte recipe, but with rhubarb in place of apple.

Baked Puddings

Smile Girl Smile Pudding

1 cup of flour
1 tablespoon of butter
¼ teaspoon of salt
1 teaspoon of baking powder
½ cup of milk or water

Rub the butter into the sifted flour, baking powder, and salt. Mix in the liquid to make a scone mixture. Pat this down firmly in a deep pie dish or casserole which has been well greased. Spread over it 2 dessertspoons of golden syrup, 1 tablespoon of sugar, 1 tablespoon of butter dabbed on, and ¾ cup of boiling water. Bake the pudding for ½ hour. Be sure the dish is deep enough to allow for plenty of rising or the liquid will boil over.

Fruit Charlottes

Swiss apple pudding or "Brown Betty" is a fairly well-known recipe, but several variations can be made equally quickly if already stewed or bottled fruit (not necessarily apples) is available. The following puddings are all very appetising and though made in very similar ways, do not all taste alike. In all of them the fruit should not be too liquid; excess juice should be strained off and may be thickened with a little cornflour and served as sauce with the pudding. Plum stones are best removed. Tart fruits are better than very sweet ones and apples are suitable for all the recipes.

Baked Apple Pudding

½ pie dish of sweetened stewed apples (or other tart fruit from which the juice has been strained)
2oz. of butter
About 2 cups of crumbled breakfast biscuits or flakes
3oz. of coconut
1 teaspoon of cinnamon
2oz. of sugar

Half fill a pie dish or casserole with the fruit. Warm the butter, sugar, coconut, and cinnamon in a saucepan, mix them all together, and crumble in the breakfast biscuits or flakes. Spread this mixture on top of the fruit. Bake the pudding for 20 minutes in a moderate oven.

Dried Crumbs Apple Pudding

Stewed apples or other fruit with the juice strained off
1 teaspoon of cinnamon
1 cup of dry breadcrumbs
¼ cup of butter, lard, or soft fat
½ cup of sugar

Cream the fat and sugar and add the crumbs and cinnamon. Spread this mixture over the apples in a greased casserole or pie dish. Bake the pudding until the crust is slightly browned.

Cheap Apple Charlotte

4oz. of stale bread
2oz. of brown sugar
3 tablespoons of soft fat
¾lb. of apples
1 tablespoon of water
Grated lemon rind

Stew the apples with the water and half the sugar. (Other stewed fruit may be substituted.) Crumble the soft parts of the bread. Soak the crusts in cold water and then squeeze them as dry as possible and chop them finely. Melt the fat and mix the bread, sugar, and lemon rind with it. Line a greased pie dish or casserole with the crumb mixture, put in the fruit, and fill up the dish with the mixture. Bake the pudding 20 to 30 minutes in a hot oven.

Fruit Betty

Put alternate layers of sweetened prepared fruit and breadcrumbs in a pie dish or casserole, the last layer of crumbs being sprinkled with sugar and dotted with butter. Bake the pudding until the fruit is tender and the top crusty and golden brown. Soft fruits such as blackberries, raspberries, currants, soft ripe pears, and grapes can be used raw, but gooseberries, plums, rhubarb, apples, and other harder fruits need to be partly stewed before being baked.

Apple Crumble Pudding

3 or 4 large apples
½ cup of water
Sugar to taste
1 teaspoon of cinnamon

Grate the apples on the coarsest grater available into a greased oven dish, leaving the core. Add the cinnamon and sugar and then the water. Then sprinkle over them ½ cup of flour, ½ cup of rolled oats, 3 tablespoons (1½oz.) of butter, and ½ cup of sugar crumbled together.

Bake the pudding at 350 degrees F. for 30 to 40 minutes. Wholemeal, breakfast flakes, or all flour may be substituted for the rolled oats.

Recipes Using Pastry

If the housewife has a refrigerator, it is a good plan when making pastry to mix more than is required that day and to keep the rest in the refrigerator. It is most useful to have some ready-mixed pastry for an emergency. Some recipes for appetising puddings that take very little time to make once the pastry is ready are given below.

Fruit Square

Line a shallow tin with pastry. Grate an apple or two on it, add some chopped dates, a few raisins, a squeeze of lemon juice or a drop or two of lemon essence, a sprinkle of ground cloves, if liked, some coconut, brown sugar to taste (especially with tart apples), and some tart jam (apricot or damson is delicious). Spread the filling on so that the surface is fairly flat and sprinkle over all a little water. Cover the mixture with another layer of pastry, press down the edges, and bake it. This fruit square may be eaten hot or cold and is delicious with custard or cream.

New Zealand Tart

Line a pie plate with pastry and bake it lightly. Meanwhile mix the following:—

2oz. of butter
2oz. of sugar
1 egg well beaten
2 grated apples
1oz. of coconut

Spread the tart with raspberry jam. Pour the apple mixture over this and bake the tart again until it is golden brown.

Golden Syrup Tart

Fill previously lightly baked plate tart with crumbled stale bread and pour over this sufficient warmed golden syrup to cover the crumbs. Bake the tart until it is hot through and crisp on top.

Banana Custard Tart

Make an ordinary soft custard with eggs, in the proportion of one to each cup of milk, sufficient nearly to fill a previously baked deep plate tart. Add sugar and essence to taste. Slice a banana or two into the custard and pour it into the tart. Re-heat the tart, or if it is to be served cold, make sure the custard has cooled down before putting it into the tart.

Alternatively an extra egg may be used and the yolks only used in the custard. Whip the whites with a little sugar, spread them over the custard in the tart, and bake it until the meringue is browned.

Gelatine Puddings

Certain whipped jellies can be made to set almost at once if the following three simple rules are observed:—

1. Use more gelatine than usual to a given amount of liquid.

2. Dissolve the gelatine in the smallest possible quantity of the hot liquid and cool it quickly.

3. Beat the cold gelatine liquor into some other thickening agent such as white of egg or condensed milk.

Probably the quickest way to cool the gelatine liquor is to stand the bowl in a large basin or saucepan in the sink and run the cold tap slowly into the basin so that the water keeps overflowing and changing continuously. Be sure the bowl does not float under the tap. Stir the gelatine liquor occasionally while it is cooling. It must not be used until it is quite cold, though it need not necessarily be beginning to set.

Marshmallow

2 dessertspoons of gelatine
½ cup of boiling water
¾ cup of cold water
¼ teaspoon of citric acid
3 egg whites
Pinch of salt
¾ cup of sugar
¼ teaspoon of lemon essence

Dissolve the gelatine and citric acid in boiling water, add the cold water, and cool the liquor quickly. Add the salt to the egg whites and beat them until they are stiff. Gradually add the cold gelatine and the sugar, a little of each at a time, beating the mixture constantly. Add the essence. Pile the mixture into a glass dish.

A good combination is marshmallow served with fruit and a custard made from the egg yolks. It is ready almost immediately for use, but is better if left to stand for about an hour.

The rind and juice of a lemon may be used instead of the lemon essence, or a teaspoon of concentrated fruit extract (for making fruit drinks) instead of the essence and citric acid. The whole pudding may be coloured, or one-third of the mixture may be coloured and put between two white layers when the pudding is put into the glass dish.

Unsweetened Condensed Milk Jelly

1 packet of jelly crystals
1 cup of boiling water
1 tin of unsweetened condensed milk

Dissolve the jelly crystals in the cup of boiling water and cool the liquor quickly. Pour the condensed milk into a bowl and beat it until it is thick. Then pour the cold jelly liquor into it a little at a time and continue beating. Pour the jelly into a wet mould and leave it to set in a cold place, preferably a refrigerator, or in a large basin of cold running water as described earlier.

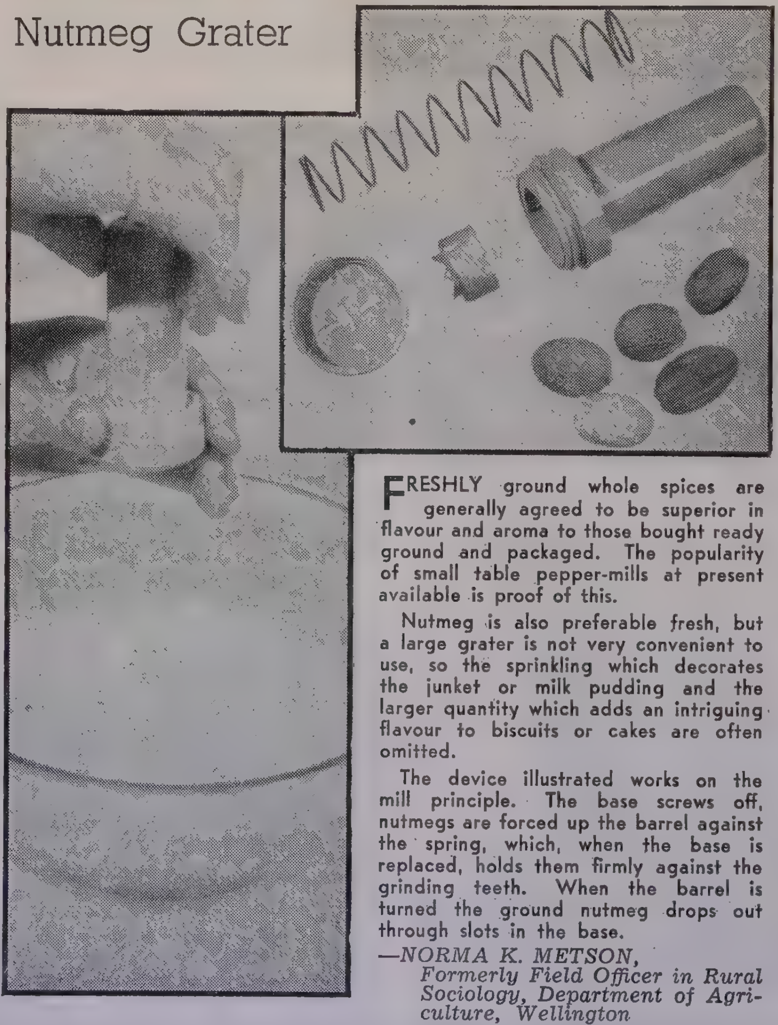
Sweetened Condensed Milk Jelly

1 tablespoon of gelatine
½ cup of boiling water
Rind of 2 or 3 lemons
About ¼ cup of lemon juice
½ tin of sweetened condensed milk
½ cup of cold water

Dissolve the gelatine in the boiling water, add the cold water, and cool the liquor quickly. Mix the lemon juice and rind with the condensed milk and beat it until it is smooth. Add the cold gelatine liquor a little at a time, beating all the time. Pile the mixture into a glass dish. If the mixture appears too thick, add more water.

Other acid fruit juice and pulp, such as damson, red or black currant, sour plum, or rhubarb, may be substituted for the lemon juice and cold water.

Nutmeg Grater



FRESHLY ground whole spices are generally agreed to be superior in flavour and aroma to those bought ready ground and packaged. The popularity of small table pepper-mills at present available is proof of this.

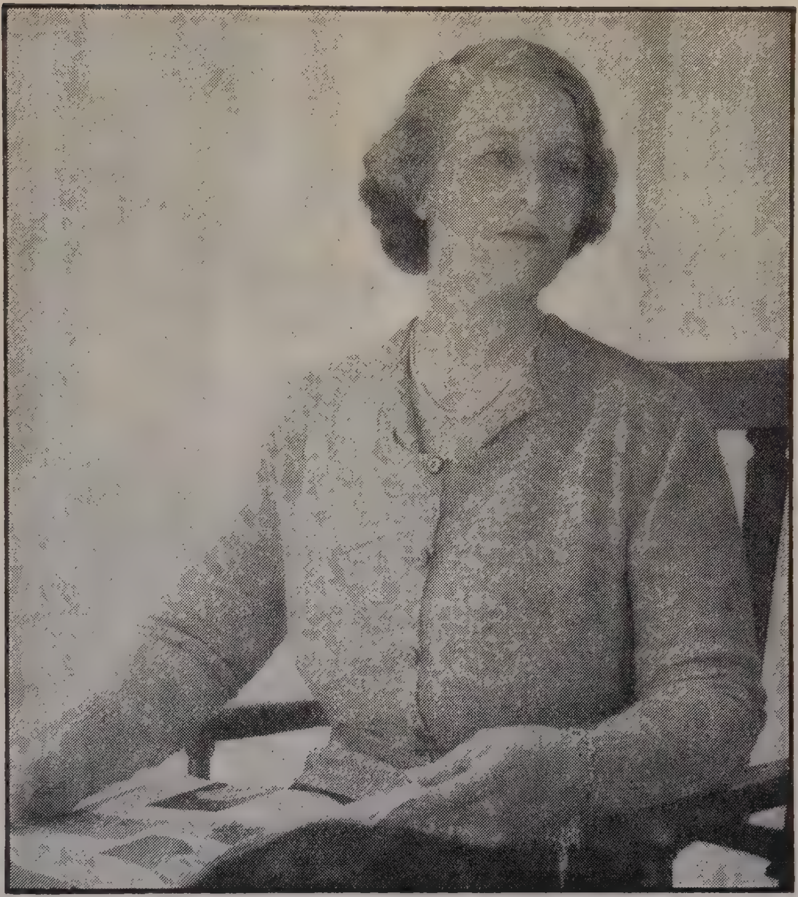
Nutmeg is also preferable fresh, but a large grater is not very convenient to use, so the sprinkling which decorates the junket or milk pudding and the larger quantity which adds an intriguing flavour to biscuits or cakes are often omitted.

The device illustrated works on the mill principle. The base screws off, nutmegs are forced up the barrel against the spring, which, when the base is replaced, holds them firmly against the grinding teeth. When the barrel is turned the ground nutmeg drops out through slots in the base.

—*NORMA K. METSON,*
Formerly Field Officer in Rural Sociology, Department of Agriculture, Wellington

Unusual Twin Set in Neutral Tone

MANY women want a plain twin set to wear with several different skirts. The pattern given below should prove suitable if it were made up in a neutral shade. This simple design would look well with a variety of materials, and the unusual neck could be transformed in many ways with the use of a scarf, cravat, or other accessories.



ABBREVIATIONS: K., knit; p., purl; st., stitch(es); inc., increase; dec., decrease; tog., together; sl., slip; p.s.s.o., pass slipped stitch over; beg., beginning; cont., continue; st.st., stocking stitch; rep., repeat; foll., following; rem., remaining.

The Cardigan

Materials: 10oz. of grey 3-ply wool; 2 No. 10 and 2 No. 12 knitting needles and 2 short No. 12 needles for front borders; 7 buttons. Measurements: Length, 20in.; bust, 42 to 43in.; sleeve seam, 17in. Tension: 7½ stitches to 1in.

Back

With No. 12 needles cast on 120 st. and work in k. 1, p. 1 rib for 4in. Next row: Rib 7, work twice in next st., * rib 14, work twice in next st. Rep. from * to last 7 st., rib 7. (128 st.). Change to No. 10 needles and cont. in st.st. (1 row k., 1 row p.), inc. 1 st. at both ends of the next and every foll. 6th row until there are 150 st. Then cont. straight until work measures 11½in. from cast-on edge.

Shaping Armholes

Cast off 6 st. at beg. of next 2 rows, then dec. 1 st. at both ends of every row until 116 st. remain. Cont. straight until work measures 20in. from cast-on edge, ending with a p. row.

Shaping Neck and Shoulders

Next row: K. 47, cast off next 22 st., k. to end. Now work on this second set of 47 st. for one side of neck thus:—

First row: Cast off 10, work to the last 2 st., work 2 tog. Second row: Work 2 tog., work to the end. Rep. these 2 rows twice more. Cast off rem. st. Rejoin wool at neck edge to rem. 47 st. and work to the end. Now work to match first side of neck.

Right Front

With No. 12 needles cast on 76 st. and work ¼in. in k. 1, p. 1 rib. Now make a buttonhole thus:—

Next row: Rib 4, cast off next 4 st., rib to the end. Next row: Rib to the last 4 st., cast on 4, rib 4. Cont. in rib, making 2 more buttonholes in the same way above first buttonhole at intervals of 1¾in., measured from cast-off edge of previous buttonhole. Then cont. in rib until work measures 4in. from cast-on edge, ending at side edge (opposite edge to buttonholes). Next row: * Rib 7, work twice in next st. Rep. from * to last 12 st., rib 12. (84 st.). Now change to No. 10 needles and work in st.st. for main part, inc. 1 st. at the end of the next and every following sixth row, but keep the first 12 st. at front edge on the short No. 12 needles and in k. 1, p. 1 rib for front border. Thus the next 2 rows will be:—

First row: With short No. 12 needles rib 12. With No. 10 needle k. to the last st., k. twice in last st. Second row: With No. 10 needle p. to the last 12 st. With short No. 12 needle rib 12. Cont. thus, inc. 1 st. at the end of every sixth row until there are 95 st., and at the same time work buttonholes in front border as before, but at intervals of 3in. from cast-off edge of previous buttonhole. Then cont. straight until work measures 11½in. from cast-on edge, ending at side edge.

Shaping Armhole

Still making buttonholes as before until there are 6 buttonholes altogether, cast off 6 st. at beg. of next row, then dec. 1 st. at armhole edge in every row until 78 st. remain. Then cont. straight until work measures 15½in. from cast-on edge, ending at front edge. There should now be 2¾in. worked after sixth buttonhole.

Shaping Neck

Next row: Cast off 29, work to the end. (49 st.). Next row: Work to the end. Now work shoulder dart thus:—

Next row: K. 27, p. 1, k. 21. Next row: P. 21, k. 1, p. 27. Rep. these 2 rows 6 times more. Next row: K. 25, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 19. Next row: P. 20, k. 1, p. 26. Work 12 rows straight, keeping the continuity of the p. st. for line of dart. Next row. K. 24, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 18. Next row: P. 19, k. 1, p. 25. Work 12 rows straight as before. Next row: K. 23, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 17. Next row: P. 18, k. 1, p. 24. Work 12 rows straight. Next row K. 22, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 16. Next row: P. 17, k. 1, p. 23. Now cont. straight, still working the p. st. until work measures 22in. from cast-on edge, ending at side edge.

Shaping Shoulder

Next row: Cast off 10, work to the end. Next row: Work to the end. Rep. these 2 rows twice more. Cast off.

Left Front

With No. 12 needles cast on 76 st. and work 4in. in k. 1, p. 1 rib. Next row: Rib 12, * work twice in next st., rib 7. Rep. from * to end. (84 st.). Now work main part in st.st. on No. 10 needles, inc. 1 st. at the beg. of the next and every foll. sixth row, but keep the 12 st. at front edge on short No. 12 needles and in K. 1, p. 1 rib. Thus the next 2 rows:—

First row: With No. 10 needle k. twice in first st., k. to the last 12 st.; with short No. 12 needle rib 12. Second row: With No. 12 needle rib 12. With No. 10 needle p. to end. Cont. thus, inc. 1 st. at beg. of every sixth row until there are 95 st. Then cont. straight until work measures 11½in. from cast-on edge, ending at side edge. Shape armhole as for right front, omitting buttonholes, then cont. straight until work measures 15½in. from cast-on edge, ending at front edge.

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Shaping Neck

Next row: Cast off 29; work to the end. Next row: Work to the end. Now work shoulder dart in same way as for right front, but reversing the number of st. on either side of the p. st. Thus the next 2 rows will be:—

First row: K. 21, p. 1, k. 27. Second row: P. 27, k. 1, p. 21. Complete to match right front.

Sleeves

With No. 12 needles cast on 56 st. and work 2½in. in k. 1, p. 1 rib. Next row: * Work twice in first st.; rib 3. Rep. from * to end. (70 st.). Change to No. 10 needles and cont. in st.st., inc. 1 st. at both ends of the next and every foll. sixth row until there are 110 st. Then cont. straight until work measures 17in. from cast-on edge.

Shaping Top

Dec. 1 st. at both ends of every alternate row until 70 st. remain. Now dec. 1 st. at both ends of every row until 50 st. remain. Cast off 4 st. at beg. of next 8 rows. Cast off rem. st.

Neck Borders

With No. 12 needles and right side of work facing pick up and k. 42 st. evenly along back neck edge and work ¾in. in k. 1, p. 1 rib. Cast off fairly loosely in rib. With No. 12 needles and right side of work facing pick up and k. 32 st. along cast-off edge at neck of right front, 1 st. at corner, then pick up and k. 60 st. along straight neck edge. (93 st.). Now work thus:—

Next row: Work in rib to the end, beg. and ending with p. 1. Next row: Work to within 2 st. of corner st., work 2 tog., p. 1, work 2 tog., rib to end. Next row: Rib to end, allowing for dec. st. Rep. the last 2 rows until border measures ¾in., making a buttonhole in the next 2 rows above previous buttonholes. With No. 12 needles and right side of work facing pick up and k. 60 st. evenly down straight neck edge of right front, 1 st. at corner, then 32 st. along cast-off edge. Now work to match right neck border, omitting buttonhole.

Make-up

Press work lightly with a hot iron and damp cloth. Join side sleeve and shoulder seams. Make a stitched dart on both fronts, taking in 2in. from about 1in. above beg. of armhole shaping and seaming to nothing in about 3in. Sew in sleeves, press seams, and sew on buttons to match buttonholes.

The Jumper

Materials: 10oz. of grey 3-ply wool; 2 No. 10 and 2 No. 12 knitting needles; 2 short No. 12 needles for neck-opening border.

Measurements: Length, 19½in.; bust, 42in., sleeve seam, 5in.

Back

With No. 12 needles cast on 120 st. and work in k. 1, p. 1 rib for 3½in. Next row: Rib 7, work twice in next st., * rib 14, work twice in next st. Rep. from * to last 7 st., rib 7. (128 st.). Change to No. 10 needles and complete exactly as given for back of cardigan, beginning after inc. row at end of welt, but working armhole shaping when work measures 11in. and neck and shoulders at 19½in.

Front

With No. 12 needles cast on 128 st. and work 3½in. in k. 1, p. 1 rib. Next row: Rib 3, work twice in next st., * rib 7, work twice in next st. Rep. from * to last 4 st., rib 4. (144 st.). Change to No. 10 needles and cont. in st.st., inc. 1 st. at both ends of the next and every foll. sixth row until there are 166 st. Then cont. straight until work measures 11in. from cast-on edge.

Shaping Armholes

Cast off 6 st. at beg. of next 2 rows, then dec. 1 st. at both ends of every row until 132 st. remain. Cont. straight until work measures 13in. from cast-on edge, ending with a p. row.

Dividing for Neck Opening

Next row: K. 60, with a short No. 12 needle work twice in each of the next 4 st., turn, and cast on 8 st. with short No. 12 needle. Leave remaining 68 st. on spare needle and cont. on these 76 st. for left side of neck opening, keeping the 16 st. at centre on short No. 12 needles and in k. 1, p. 1 rib, and working rem. 60 st. in st.st. on No. 10 needles until work measures 15in. from cast-on edge, ending with a row on the wrong side. Now work shoulder dart thus:—

Next row: K. 21, p. 1, work to end. Next row: Work to the last 22 st., k. 1, p. 21. Rep. these 2 rows 6 times more. Next row: K. 19, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., work to end. Next row: Work to the last 21 st., k. 1, p. 20. Work 12 rows straight, keeping continuity of the p. st. for line of dart. Next row: K. 18, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., work to end. Next row: Work to the last 20 st., k. 1, p. 19. Work 5 rows straight as before, thus ending at neck-opening edge.

Shaping Neck

Next row: Work across the 16 border st. and leave these st. on a safety-pin, work 2 tog., work to end. Work 6 more rows, still keeping p. dart st. and dec. 1 st. at neck edge in every row. Next row: K. 17, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., work to the last 2 st., work 2 tog. Next row: Work to the last 19 st., k. 1, p. 18. Work 5 rows keeping p. dart st. and dec. 1 st. at neck edge in every right side row. (43 st.). This completes neck shaping. Work 7 more rows straight. Next row: K. 16, sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., work to end. Now still keeping p. dart st., cont. straight until work measures 21½in. from cast-on edge, ending at armhole edge.

Shaping Shoulder

Next row: Cast off 10, work to the end. Next row: Work to the end. Rep. these 2 rows twice more. Cast off. Return to rem. st. on spare needle and with right side of work facing and using the short No. 12 needles, rejoin wool and work twice in each of the first 8 st., then with No. 10 needles k. to the end. Keeping the 16 st. at centre edge of short No. 12 needles, and in k. 1, p. 1 rib, cont. straight until work measures 15in. from cast-on edge, ending with a row on the wrong side. Now work shoulder dart thus:—

Next row: Work to the last 22 st., p. 1, k. 21. Next row: P. 21, k. 1, work to end. Rep. these 2 rows 6 times more. Next row: Work to the last 24 st., sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. to end. Next row: P. 20, k. 1, work to end. Work 12 rows straight, keeping p. dart st. Next row: Work to the last 23 st., sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 18. Next row: P. 19, k. 1, work to end. Work 6 rows straight as before, thus ending at neck-opening edge.

Shaping Neck

Next row: Work across the 16 border st. and leave these st. on a safety-pin, work 2 tog., work to end. Work 5 more rows, still keeping p. dart st. and dec. 1 st. at neck edge in every row. Next row: K. 2 tog., k. to last 22 st., sl. 1, k. 1, p.s.s.o., p. 1, k. 2 tog., k. 17. Next row: P. 18, k. 1, p. to the last 2 st., work 2 tog. Work 5 rows keeping p. dart st. and dec. 1 st. at neck edge in every right side row. (43 st.). Work 7 rows straight, then work final dart shaping. Cont. straight until work measures 21½in. from cast-on edge, ending at armhole edge. Shape shoulder as given for first side.

The Sleeves

With No. 12 needles cast on 86 st. and work 1in. in k. 1, p. 1 rib. Change to No. 10 needles and cont. in st.st., inc. 1 st. at both ends of the next and every foll. fourth row until there are 102 st. Cont. straight until work measures 5in. from cast-on edge.

Shaping Top

Dec. 1 st. at both ends of next and every foll. fourth row until 82 st. remain. Then dec. 1 st. at both ends of every alternate row until 62 st. remain. Now dec. 1 st. at both ends of every row until 46 st. remain. Cast off 5 st. at beg. of next 6 rows. Cast off rem. st.

The Front Facing

With No. 10 needles cast on 44 st. and work 2 rows in st.st.

Divide for Neck Opening

Next row: With No. 10 needle k. 16; with No. 12 needle work twice in each of the next 4 st., turn and cast on 8 st. with No. 12 needle. Leave rem. 24 st. on spare needle and cont. on these 32 st., keeping the 16 st. at opening edge in k. 1, p. 1 rib on No. 12 needles until work measures 5½in. from cast-on edge, ending at opening edge.

Shaping Neck

Next row: Work across the 16 border st. and leave these st. on a safety-pin, cast off 1 st., work to end. Cont. in st.st., dec. 1 st. at neck edge in every row until 8 st. remain. Now dec. 1 st. at neck edge in every alternate row until 5 st. remain. Cont. straight until work measures 3½in. from beg. of neck shaping. Cast off. Return to rem. st., and with right side of work facing, rejoin wool at opening edge with No. 12 needles, work twice in each of the first 8 st., then with No. 10 needles, work to the end. Now work on these 32 st. to match first side.

Neck Border

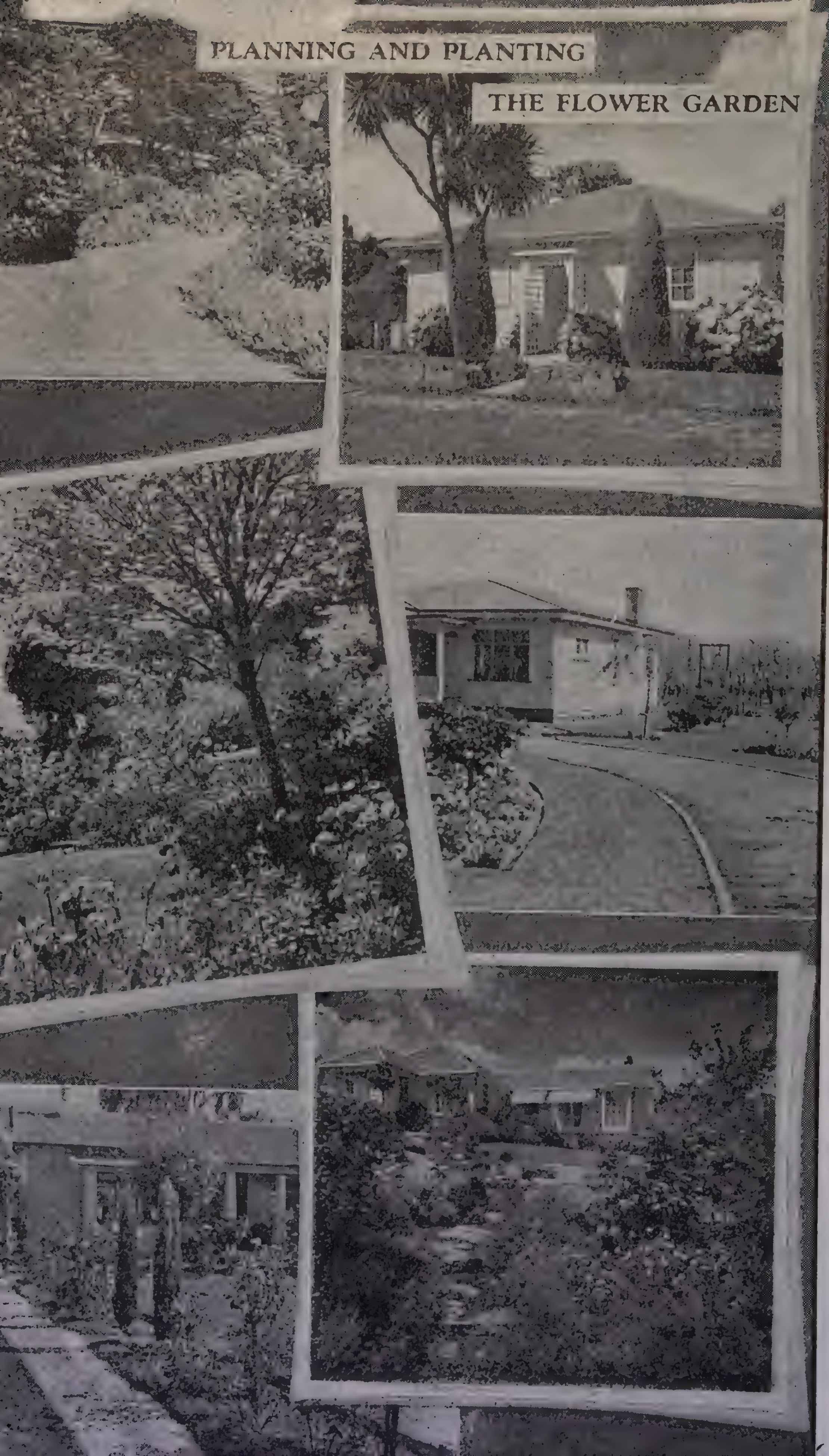
Join shoulder seams. With right side of work facing, and using No. 12 needles, work in k. 1, p. 1 rib across the 16 border st. from safety-pin at right-hand side of neck opening, pick up and k. 98 st. evenly all round neck edge, then work in rib across the 16 st. from safety-pin at left-hand side of neck opening. Work 1in. in k. 1, p. 1 rib. Cast off in rib.

Make-up

Press work lightly with a hot iron and damp cloth. Join side and sleeve seams and make stitched darts in front armhole shaping in same way as in cardigan. Sew in sleeves. Pin front facing into position on wrong side and sl. st. down neatly. Sew down cast-on edge of underwrap on wrong side. Press all seams.

PLANNING AND PLANTING

THE FLOWER GARDEN



Top left—The drive sweeps round the base of a rise to emphasise the change in contour. Planting of trees and herbaceous borders makes the drive a feature of the garden.

Top right—A delightfully simple planting even in the smallest area can give character to a house. Douglas Elliott photo.

Middle left—Maples and other small-growing trees underplanted with wide, sweeping borders of bulbs and perennials give this garden a spacious, restful design. Douglas Elliott photo.

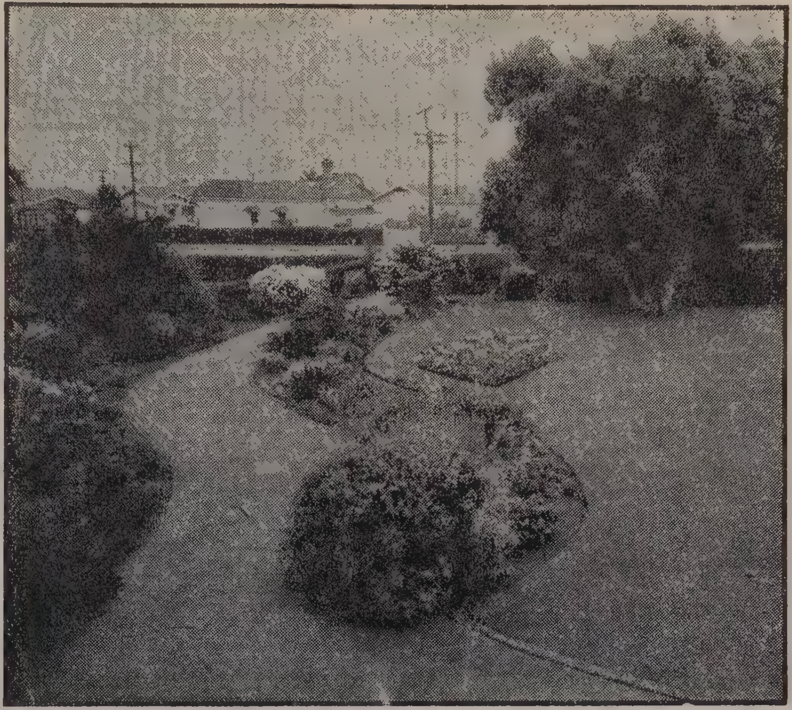
Middle right—The curve of this lawn-bordered drive is followed out by flower borders on each side. Russell Orr photo.

Lower left—A well-planned garden with paths and drive bordered with rose beds and a clear expanse of lawn in the background to show off their beauty. Russell Orr photo.

Lower right—Garden maintenance is reduced to a minimum in this attractive residence. Skilful use of rockwork in paths and careful informal shrub planting have created the impression that the house is set farther back from the road than it is. The small lawn in front has offset the tendency of foundation planting to diminish the size of the building and draws attention to the style of the architecture. Tall shrubs planted on either side in the foreground have created an excellent vista effect, focusing attention on the front entrance to the building. Sparrow photo.

Planning and Planting the Flower Garden

ALMOST every home site has possibilities for developing an interesting garden, but whether an established garden is being redesigned or a new one planned, problems will be met on each section. This article by M. J. Lockie, Horticultural Instructor, Department of Agriculture, Auckland, sets out basic points to be considered in planning and planting a garden. Application of these recommendations modified to suit individual tastes or special circumstances will contribute toward the achievement of satisfactory results. The section on flower garden work for August is by H. P. Thomas, Horticultural Instructor, Department of Agriculture, Wanganui.



[*Sparrow*

Small islands cut from lawns seldom enhance the beauty of suburban grounds. Not only do they materially reduce spaciousness, but also they create additional maintenance problems in edges to cut and obstacles for the lawnmower. The sweeping vista of lawn, well set out shrub border, and path are badly marred by such an undesirable feature in the garden illustrated above.

WHEN a new garden is being established or an old one substantially re-arranged it is necessary to have a plan based on a mental picture of the garden desired. Many minor problems and details can be worked out as they arise, but factors which may have major effects on the layout must be considered before work is begun. It may be necessary to adjust the original conception to meet major natural features or buildings which cannot be altered. The amount of work, materials, and finance required for the project, should be considered when the plan is being prepared. Factors likely to influence the layout substantially may include soil drainage, the house and other buildings, paths and drive, shelter, the natural contour of the land, and climate.

Contour of the Land

Unless a section is reasonably level, it is essential that the contour of the land should form an integral part of the plan if costs are to be kept down to a reasonable level. If possible, the home, other buildings, and paths should be so designed that advantage can be taken of natural features. Generally this is preferable to attempting to make the natural lie of the land conform to preconceived ideas as to the placing of artificial features.

Drainage

In making plans soil drainage and the disposal of surface water must be considered. In many sections this can be difficult and may definitely affect the layout. Drainage in most home sections should be permanent and consequently should be of permanent materials. The most satisfactory drains are constructed of field tiles. Scoria or metal drains carefully constructed and with a minimum depth of 12in. to 18in. of metal may be considered permanent. Fascine drains are effective for a number of years, but are not suitable for use in positions where it would be difficult or very costly to renew them. Open drains in most situations are undesirable, but if they are concealed by hedges or shrubs, they can sometimes be used effectively, particularly along boundaries. Unfortunately they can be a constant source of trouble in that they must be kept free of weeds to allow free movement of water.

If no satisfactory surface outflow from the section can be found, it may be necessary to dig deep sump holes and to fill them with rocks to take the surplus water. In heavy soils these sumps must be of considerable capacity, as seepage of the water into the surrounding soil can be very slow.

All drains which cross beneath the lines of permanent features, such as driveway or paths, should be planned and installed before the latter are laid down.

Some soil types permit free natural drainage, though heavier soils, especially those with stiff clay subsoils, tend to hold too much water for long periods, especially in winter and spring, if effective drainage is not provided.

Few trees or plants will thrive, and many will not live, in situations where there is excess soil moisture for many weeks at a time. Therefore soil drainage should be well planned and provided for at the outset.

Shelter

Shrubs, flowers, and even trees cannot generally establish and thrive when constantly being subjected to buffeting winds, so where more tender subjects are to be planted adequate shelter should be provided beforehand.

Whatever shelter is chosen, whether it is of board fences, live hedges, or trees and shrubs, it should be in keeping with the plan, as well as providing the protection necessary. Where tall-growing trees are required care should be taken to ensure that they are planted far enough from the house, as crowding round the house prevents the free circulation of air, blocks out sunlight, and spoils the appearance of the house by giving it a hemmed-in look. Formal trimmed hedges occupy little space and in many places are the best shelter for a small garden, but hardy shrubs and small trees are often more attractive. If possible, very long or very high hedges should be avoided. They must be trimmed several times each year to keep them in good condition and appearance, and this involves a good deal of work.

Among the numerous hedge plants, two good varieties are *Abelia floribunda* and *Lonicera nitida*. In frost-free areas *Tecoma capensis* provides a fresh green hedge, but it requires support if the height is to exceed about 5ft. Rapid shelter may be gained with buddleia species, which grow readily from cuttings. In windswept coastal areas *Corokia cotoneaster* can be used.

Where a hedge is used as a division in the garden or as a boundary outline rather than as shelter flowering shrubs may be used, such as flowering currant (*Ribes sanguineum*), grevillea (*Grevillea rosmarinifolia*), and particularly the bright orange and red flowered japonicas (*Chaenomeles lagenaria*).

Shrubs with variegated and coloured foliage are also effective; for example, golden euonymus (*Euonymus japonica aurea*), golden ake ake (*Olearia paniculata* syn. *forsteri*), or *Photinia glabra rubens* with its bright red, young growing tips.

Paths and Drive

Placing of paths and drive may influence garden design considerably. They should be reasonably direct, as unnecessarily winding main paths almost inevitably lead to short cuts being taken across lawns and even garden beds. However, slightly curved paths are usually more attractive than straight ones. If possible, the drive and paths should be laid down in permanent materials such as concrete or bitumin. Gravel paths can be attractive, but require constant attention to weed control and must be resurfaced periodically to maintain their appearance and serviceability. Minor paths which are not in constant use may be laid down in lawn. Crazy pavements or isolated flags may be used very effectively to reduce wear on frequently used routes across lawns, but the stones or slabs should be laid flush with ground level to facilitate lawn-mowing.

Details of Layout

After attention has been given to the principal controlling features of the garden layout it is possible to proceed with details of the plan. To many people it is helpful to draw a plan showing the boundaries of the section, an outline of the house foundations, and permanent features, such as drive and garage. Flower beds can be outlined and the positions of shrubs and trees shown by circles of varying size indicating their probable diameter at maturity.

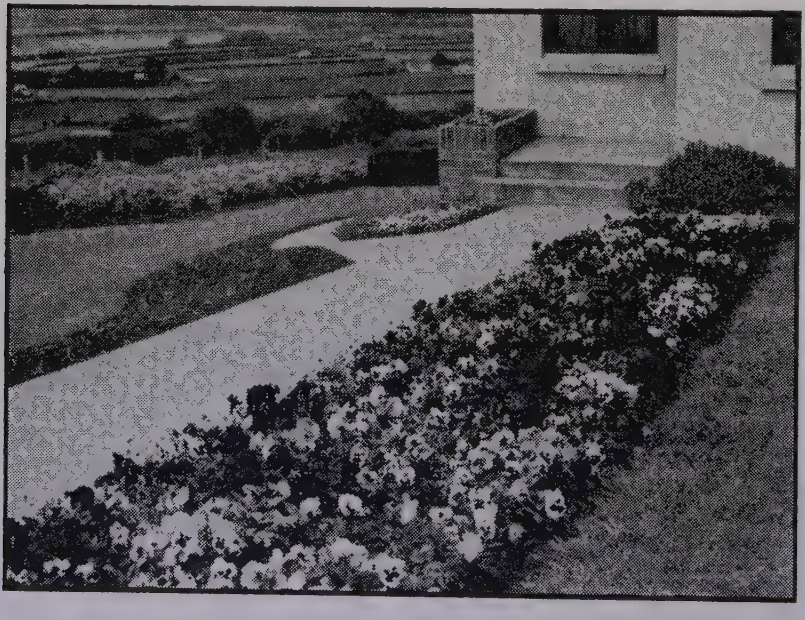
The garden may be divided into several main sections:—

1. The front or public part between house and road. The objective is to make this section and the house as attractive as possible and it is therefore desirable to maintain interest throughout the year with a planned succession, using ornamental trees and shrubs as well as flower beds. Careful selection of trees, shrubs, and the more permanent perennials is essential, but flower beds will be varied from year to year.
2. The utility section of the garden, which includes fruit trees and a vegetable plot, is usually at the back of the section and may include a small lawn for a clothes line. The compost heap and incinerator may be located in an inconspicuous position in this section also.
3. A section of the garden designed for outdoor use by the family and screened reasonably well from the road and from direct overlooking from neighbouring sections. Here there may be a children's play area or a swimming pool or tennis court.

Choice of Trees and Shrubs

The positions of trees and shrubs, the numbers required, and the forms to use will depend very much on the type of garden and home. A sense of proportion must be maintained, for although groups of large trees will give dignity and character to spacious grounds, they will merely crowd out and spoil the appearance of smaller sections.

If there are good views beyond the boundary, they may be framed by the use of trees on one or both sides and thereby become almost a part of the garden plan. In some instances suitable low foreground planting may be all that is required. Undesirable outlooks may be effectively hidden by the use of suitable trees, shrubs, or hedges.



A distant view which could well be enhanced by planting to obscure the untidy hedges immediately beyond the property, using either a shrub border or individual large trees.

Extensive blank walls, terraces or banks, and very high house foundations may be softened by the use of shrubs or climbers.

Trees and shrubs will filter dust from roads and to some extent absorb the sound of heavy traffic.

Houses with very low roofs will appear less squat if a tree can be seen breaking the skyline above the roof. Similarly with houses below the level of the road, trees or tall shrubs between road and house break the unobstructed view of the roof and create a more pleasing impression.

Upright-growing trees planted on each side of the garden suggest width, whereas the section appears narrow if they are set close together. Some thought should be given to choosing trees in keeping with the type and style of the house. The Mediterranean styles look well with palms or such trees as the Italian cypress (*Cupressus sempervirens stricta*). However, trees of these types are sometimes difficult to blend with deciduous trees and they look rather out of place with most of the more conventional wood and brick houses.

Almost every gardener has favourites in the plant world. Scents, colours, and shapes have individual appeal. However, such preferences must be tempered by the environmental conditions, as climate and soil types affect the behaviour of the trees. In particularly wet localities trees which will stand up to more soil moisture should be selected, whereas different kinds should be used in rocky or dry positions.

When trees and shrubs are being considered it is helpful to look around local parks and gardens and private gardens in the neighbourhood. Generally those plants which are most suited to the conditions will be found in great abundance, but by careful study of local conditions it will be possible to find also many of the less commonly grown kinds which do well.

A most important point to consider in choosing trees and shrubs is their probable height and diameter at maturity. Most of the young stock purchased from nurseries looks very small when it is planted and there is a tendency among amateur gardeners to plant comparatively large trees and shrubs at spacings more suitable for small shrubs or hedge plants. The result is usually overcrowding within a few years with consequent spoiling of the beauty of the specimens planted. In general the most vigorous plants of the collection take charge and smother the slower-growing or smaller ones. The final effect is then very much inferior to that which was planned.

Preparation for Planting

When the general planning of the section and selection of the positions for the principal trees, shrubs, and garden beds has been made clearing of the section may proceed.

On a new section builders usually leave a considerable amount of rubble and mortar on the ground. Most of this material is unsuitable for working into the soil in gardens and should be cleared away and buried or removed from the section.

It may be possible to make use of trees or shrubs already growing on the section, particularly on boundaries,

[Sparrow

This farm house is hemmed in by hedges planted far too close. From three sides of it there can be no outlook from the windows.

but they should be carefully looked over and considered in relation to the garden plan before decisions are made. Very old or undesirable specimens or those which are in obviously unsatisfactory positions should be cut down and the stumps removed so that they will not interfere with the development of new plants. Gorse, blackberries, briers, and other such coarse weeds should be disposed of as soon as possible. It is not sufficient merely to cut these down, as they all grow again from the stumps. The only satisfactory way of dealing with them is to take out the roots. Weedkillers may be of some assistance in disposing of such undesired growth, but they should be used with discretion, because unlimited quantities may render soil unusable for a considerable period or may have an effect on nearby plants on which they were not intended to be used.

Such weeds as convolvulus, twitch grasses, and heavy infestations of docks are best dealt with as the land is prepared for flower or vegetable beds or for lawns. It is almost impossible to rid the soil entirely of such weeds and if left for any time before regular cultivation can be maintained, they will re-establish strongly.

Although weedkillers may be of assistance in initial clearing of the land, no one specific will kill all weeds. Most weedkillers need to be applied several times to effect complete eradication. The most effective way of dealing with almost all kinds of weeds is thorough digging and cultivation of the land and removal of as much as possible of the rooting system of each weed. This means hard and careful work, but it is worth while.

In very weedy sections it is common practice to grow potatoes or a heavy cover crop of lupins for a season. With potatoes the frequent cultivation required as they grow helps to destroy weeds and weed seeds as they germinate, but with a lupin crop the effect of shading of the soil and smothering of weed seedlings is considerable.

Flower Beds and Lawns

In the broad plan for the garden provision will have been made for flower beds, borders, and lawns.

In laying down and care of lawns care in preparation, levelling, and the sowing of good seed cannot be overemphasised. A well-laid lawn is one of the most important assets in any garden plan.

Flower beds in lawns can be very effective and may be desired by many gardeners, but this feature can be overdone. The lawn itself and the effect of spaciousness created by it can be nullified by placing flower beds in it; also there is the difficulty in mowing lawns which are broken by flower beds of irregular shapes and sizes. Flower borders may follow the boundaries or other features of the garden, but long, straight, and narrow borders are seldom as effective as wider or curved ones.

The most effective borders are those which slope slightly upward from the level of paths or lawns. Lawns show plants off much more effectively than do asphalt or concrete paths, and for that reason even a narrow strip of lawn between drive or path and a side border is an advantage.

Colours

Though it is generally accepted that flower colours combined with varying shades of green foliage blend much more effectively than do artificial colours, there are a few pitfalls. For example, mauve pink chrysanthemums planted against a red brick wall or house foundation would be unattractive, whereas mixed yellow and bronze chrysanthemums would give a striking effect. On the other hand mauve pink chrysanthemums planted beside a grey or white wall could be very effective.

It is seldom possible or even desirable to attempt to achieve colour all over the garden at one time. Usually it is better to plan a few striking displays at different points and to maintain a succession of such colourful spots throughout the year. Instead of planting long rows of a particular shrub or plant it is usually better to arrange plants in groups. Examples are a drift of lavender autumn crocuses in the foreground of a small evergreen or a cluster of pink belladonnas with bare brown stems at the base of the smooth trunked pink flowering *Eucalyptus leucoxylon rosea.* In some situations daffodils may be planted in lawns, but the quality of the lawn will be affected. Spring bulbs are more effective in groups or drifts than in rows or borders.

In perennial borders grouping of reds, white, blues, and yellows will be effective, but pinks and mauves should not be placed close to oranges or reds. All of the colours may be used in a garden at one time if they are so placed that the less compatible groups cannot be seen together at the same time. If separated by green foliage or lawns, flower colours seldom clash.

Planting of Trees and Shrubs

Trees and shrubs should be ordered well before planting time. Buyers who order early in the season usually get a far better selection of plants to choose from in the nurseries.

Deciduous trees should be transplanted between June and August, but evergreens transplant more satisfactorily when the ground is warmer, in September or October. In selecting shrubs or trees from a nursery it is not always wise to choose the largest. A strong root system in relation to the size of the plant or tree is most important. Unless larger specimens have very good root systems, it will usually be found that medium-sized plants establish more readily. Often with larger plants and especially evergreens it is advisable to provide some shading from the sun if the weather becomes warm and dry within a few months of planting. Where there is insufficient protection from wind this is advisable until plants become strongly established.

Roots of plants from the nursery should be carefully inspected. Damaged roots should be removed and the ends of sound ones should be trimmed neatly. Trees with dry roots should be placed in a bucket of water for several hours and all trees which must be held for a period before planting should be heeled in in a cool place in the garden. Pot-grown plants should be knocked out of the pot and twisted roots should be straightened before planting. All plants should be kept under a damp sack during planting operations until required for setting in position.

The depth for planting varies to some extent, but generally shrubs may be set a little lower than they were in the nursery. Tall plants should be staked and to avoid damaging the roots it is better to drive the stakes before the plants are set.

In heavy clay soils provision should be made for drainage of planting holes. If that is not done, it is probable that water will be held in the hole with the looser soil around the plant roots and will cause death of the plant from wet feet.

Problems of many kinds will be encountered by amateur gardeners trying to make the best of difficult sections, but careful planning to take advantage of natural features will reduce the obvious disadvantages of the site.

In addition to having shrubs and flowers to provide attractive surroundings for the home, most people are interested in a vegetable garden, which for success should be located on the best soil available.

Lawns are desirable for their display effect, but lawns in the utility section, the backyard, are equally important. On very steep sections terraces become a necessity to provide reasonably level spaces for lawns and garden plots.

Though it may appear that a level section has many advantages over an apparently difficult one, and the maintenance of a level section is much easier, people with rough and hilly sections should not be discouraged. With careful planning and some extra work the final effect of a sloping section is likely to be more pleasing than anything which can be accomplished on level land.

Garden Work for August

Annual flower plants: Annual flower plants make a big contribution each season to the display of colour in the flower garden, and the raising of these plants from seed is one of the most important tasks at this time of the year.

In August, however, a start with this work should be made only where a glasshouse or frames are available and preferably with some form of heating. If these facilities are not available, sowing may be delayed with advantage until September at least. Best results are obtained if seed and plants are grown in prepared composts made from sterilised materials—turfy loam, leaf-mould, and sand—to which fertilisers may be added. Work of this nature may now be undertaken in readiness for seed sowing and the pricking out of the young seedlings.

Some of the flower seeds that may be sown if some warmth and protection can be given are: *Phlox drummondi*, nemesia, aster, antirrhinum, lobelia, livingstone daisies, salvia, ten-week stock, petunia, ageratum, cynoglossum, jacobaea, marigolds (African and French), and verbenas.

Herbaceous borders: All alterations planned should now receive urgent attention, as the general moving of plants will soon have to be discontinued. Although autumn or early winter is the best time to do any renovation work that may be necessary, this month provides a second most favourable opportunity, particularly for some frost-tender subjects, climbing plants, and evergreen shrubs.

After winter the ground in shrubberies, borders, and rockeries will have become hard and now is the time to begin loosening it by lightly pricking it over with a fork or by shallow hoeing to minimise the danger of root damage. At the same time a dressing of a complete fertiliser may be applied with advantage to most gardens. Apply a mixture of 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of muriate of potash at 2oz. to the square yard.

Lawns: Though autumn sowing of lawns is generally recommended, it can be done if necessary in August or September. The soil should, however, be in a workable condition before any preparations are attempted. The recommended seed mixture consists of 2 parts of New Zealand chewings fescue and 1 part of Government Certified browntop sown evenly at 1oz. of the mixture per square yard.

Lawns that were sown in autumn will now need some attention and in those districts where hard frosts have been experienced a light rolling will be necessary to consolidate the soil around the young roots. Some of these lawns may have made sufficient growth to warrant an initial cut with the lawnmower. It is essential to have the cutting blades properly sharpened and not set too low to avoid undue damage to the tender young grass, and rolling and cutting should be done only when the soil surface is reasonably dry.

Shrubs: Early-flowering spring shrubs such as the flowering currants, apples, plums, brooms, forsythia, and luculia should be pruned immediately after they have flowered. In addition those shrubs which will flower in summer on the new growths produced in spring should be pruned fairly hard back immediately, if they have not already been given such attention.

Shrubs in this group include *Spirea japonica*, of which a popular variety is Anthony Waterer, *Buddleia variabilis*, *Spartium junceum*, *Hydrangea paniculata*, *Tamarix gallica*, ornamental elder, willows, dogwoods (coloured bark), wistaria, cotoneasters, honeysuckle, and coral tree.

Gladiolus: Preparations should be put in hand immediately for the planting of gladiolus corms. They do best in a deep, well-drained, fairly rich rooting medium, in a sunny, sheltered position, and it is worth going to some trouble to provide these conditions. Gladiolus do not necessarily have to be planted in a bed of their own; they also show up to advantage when planted in groups throughout a border. They may be planted from now on in mild districts for early flowers, though for a main showing and a succession of blooms plantings are usually made from September onward.

Rose pruning may now be carried out, the generally recommended time being the first 2 weeks in August. The chief reason for leaving the pruning until spring is to try to avoid any damage to the young growths by late frosts. It may be necessary to delay pruning a few weeks in southern districts if further frosts are likely. After pruning the bushes should be sprayed with a Bordeaux mixture (1lb. of copper sulphate, 1lb. of hydrated lime, and 10 gallons of water) or lime sulphur (1 in 15) solution (1 gallon of lime sulphur to 15 gallons of water).

Chrysanthemums: If sufficient chrysanthemum cuttings were not taken last month (July), no time should be lost in getting them in early this month. Select the sturdiest shoots which develop a few inches away from the base of the old stem when they are a few inches above the soil. The cuttings (2in. to 3in.) should have the lower leaves removed and be severed cleanly just below a node. These should be dibbled in with a flat-ended dibble ½in. to 1in. deep and 2in. apart, either directly into the soil in a frame or into seed boxes or pots filled with light, sandy soil which can be stood in a glasshouse or frame until rooting takes place.

As soon as chrysanthemum cuttings have rooted, shown by the lighter colouring of the top growth, they should be transferred to 3in. pots.

Begonia and gloxinia tubers: For early flowering begonia and gloxinia tubers may now be started into growth, particularly where heat is available. Turn them out of their old pots and shake off all soil and half bury them in boxes of potting compost. To encourage new growths the soil is then kept moderately moist, preferably with tepid water. When growth becomes active they may be transferred to 4in. or 5in. pots.

Seeds of begonia, gloxinia, *Primula obconica*, and streptocarpus may still be sown and where this may have been done earlier the young seedlings should be pricked off into boxes or small pots as soon as they can be handled. The seed should be sown in well-drained pots or pans containing a good compost at the bottom with fine sandy loam pressed down on the surface.

Before they are sown sprinkle the soil with water from a fine syringe and then sow the seed evenly. No covering of soil is needed, but they may be lightly pressed into the surface of the soil. Cover the container with a pane of glass and brown paper and place it in a warm part of the glasshouse or better still in a frame within the house. When they have germinated remove the paper covering and gradually admit air to the seedlings.

Any watering before or after germination must be done by letting water soak slowly from below or by spraying overhead with a very fine syringe.

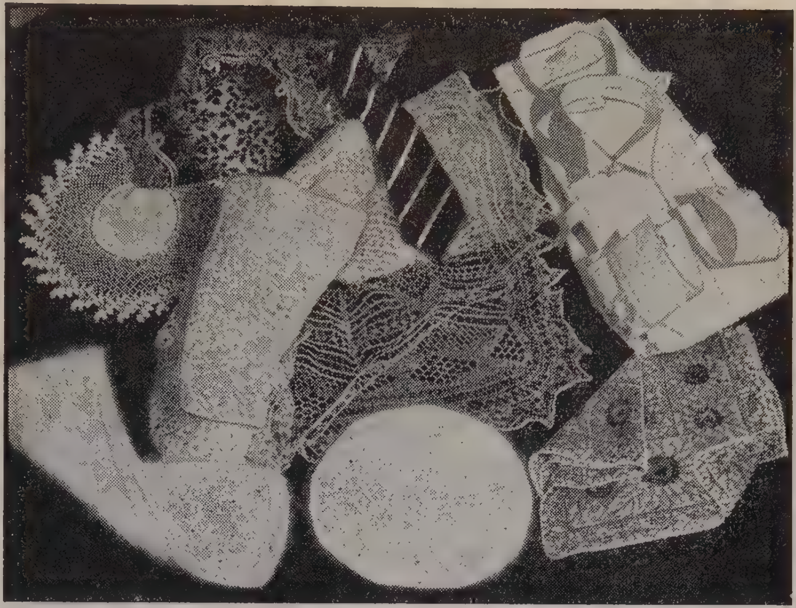
Dahlia tubers: Dahlia tubers may now be placed in boxes containing a light potting compost and moved indoors where they will quickly respond to higher temperatures and produce growths suitable for cuttings.

Pot plants: Fuchsias, pelargoniums, geraniums, and hydrangeas which have rested through winter may now be trimmed up (cut back to healthy wood with reasonable shape) and then repotted into appropriately sized pots to start them into growth for another season. Where it is necessary kentia palms, aspidistras, and ferns may also be divided and repotted at this time of the year.

Cuttings: Cuttings which may be taken for striking in the glasshouse during spring for future indoor and outdoor display are perpetual carnations, perennial phlox, perennial aster, delphiniums, geraniums, pelargoniums, hydrangeas, heliotrope, balsams, fuchsia, iresines, coleus, salvia, and lobelia.

Special Problems in Laundry Work

THE regular wash day, no matter which day of the week, is usually busy. Besides the inevitable meal preparation and the general tidying up, which, though it need not be so inflexibly accommodated in the day's programme, is almost as inevitable, the family wash has to be sandwiched in. This is the big wash, when the routine articles are done and when the main object is to get the washing on the lines as quickly as possible. This article by Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin, the first part of a two-part article concerned with special problems requiring modification of the usual technique and more time than can conveniently be given to them on the day of the weekly wash, deals with a variety of delicate fabrics. The second part of the article, describing the care required for furnishings, blankets, and other items, will appear in next month's issue of the "Journal".



ANY personal clothing or household furnishings requiring extra time and attention or particular weather conditions when being washed may be regarded as presenting a special problem. Some articles require more frequent washing, as for example infants' clothes; others such as blankets need washing only once a year. Sometimes the colour or construction of the fabric or article may demand special care in laundering or some divergence from the usual practices, or the use of chemicals such as ammonia, acetic acid (white vinegar), and soap substitutes, or dry cleaning.

Materials presenting special problems may be grouped as follows:—

Delicate or special fabrics such as chiffons, elastic (girdles and the like), fugitive-coloured materials, jersey cloth, lace, lacquered finishes, pile fabric, ribbons, ties, rubberised fabrics, satins, dress shirts, swansdown, and woollens, including lightweight and angora woollens and Shetland shawls.

Felts.

Furnishings such as bedspreads, blankets, curtains, eiderdowns and sleeping bags, and loose covers.

Infants' clothing.

Infected clothing.

Leather goods.

Outer personal clothing.

Specially stained clothing.

Trimmings.

Soaps and Detergents

For all special washing neutral soap, soapflakes, or synthetic detergents are preferable. The most convenient way to use soap is in the form of soap jelly. Soapflakes dissolve readily, but soap in this form is more expensive.

The amount of soap needed for washing depends on various factors, and no definite quantity can be given, but sufficient should be used to produce a permanent 2-inch floating lather. As the suds break down more soap should be added, and when the water becomes heavily soiled fresh water and fresh suds should be prepared. Washing gently in two lots of suds is always preferable to a vigorous attack in one. A method of making soap jelly is given here.

Soap Jelly

Cut 1¼lb. of neutral bar soap into thin slices and stir it into 1 gallon of boiling water. Keep stirring until all the soap has dissolved. A quarter pint of this jelly contains ½oz. of actual soap.

In all washing processes neutral bar soap or soap flakes are satisfactory.

Detergents are substitutes for soap. They are not made the same way or out of the same ingredients, yet can be used in place of soap for laundry work, washing dishes, and such like.

Some of the synthetic detergents are helpful because they do not form a scum with hard water and are not destroyed by the acid often present in new woollens and silks. Being neutral substances they are less likely to cause colours to run and they are also readily soluble at the lower temperatures necessary for wool fabrics, silks, and fabrics with fugitive colours. They are, however, more expensive than soap. For all washing, whether of routine or special articles, soft water is preferable to hard, and those depending on rainfall for their water supply are fortunate in this respect, rain-water being soft. Some people having another source of supply for general use still collect rain-water into tanks for washing. However, those whose water supply is hard will find instructions for making water suitable for laundry purposes on page 153 of the "Journal" for February 1952.

Delicate Fabrics

Chiffon, georgette, ninon, and similar fabrics should be treated as silk. They are washed by squeezing and pressing the water through the fabric rather than by rubbing, and are dried by being rolled in a towel, layers of white cloth being used to prevent any portions of the wet article from touching and so transferring the colours (marking off). If the colours have shown a tendency to run, the fabrics should be treated as fugitive-coloured fabrics. Ironing while still damp will restore them to their original size.

Elastic articles: As the rubber in elastic perishes with intense heat, dress shields, girdles, and similar articles should be washed at a low temperature, dried slowly at room temperature, and not ironed. Soiled parts may be cleaned by brushing them with a soft brush, not by rubbing one surface against another. Corsets may be scrubbed with a small brush and a good strong lather to which a little ammonia or borax has been added. After thorough rinsing they should be hung out in the sun to dry and bleach.

Fabrics with fugitive colours: The ordinary method of washing in hot soapy water and rinsing in water at the same temperature is not suitable for fabrics with colours that run. Heat, use of alkalis such as ammonia, washing soda, and borax, excessive rubbing, and being left wet too long all have a part in causing colours to bleed. Synthetic detergents are recommended for this type of washing; being neutral, they are easier on the dyes than an alkaline soap would be and, being readily soluble in cold water, they do not require a warm rinsing water. Gentle squeezing in warm water with the right amount of detergent is all that is necessary. The articles are rinsed in cold or tepid water until all traces of lather are removed, then dried and finished in the usual way. It must be remembered that speed in the

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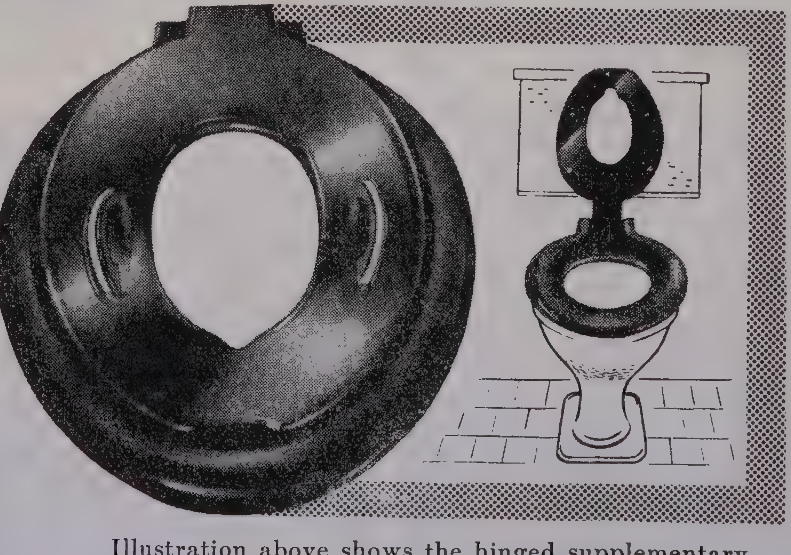

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laundering processes is essential to avoid bleeding of colours; too long contact with water alone can cause such bleeding.

Coloured Cottons and Linens

Though the colours of most cottons and linens are fast to washing, for their first washing such materials should be done separately and carefully. The colours may be fast to subsequent washings, but there is often a small amount of excess dye released in the first wash which would stain other materials in the water. Any fabric with colours not entirely fast should never be allowed to become badly soiled because of the impossibility of removing all the soiling without also removing some of the colour.

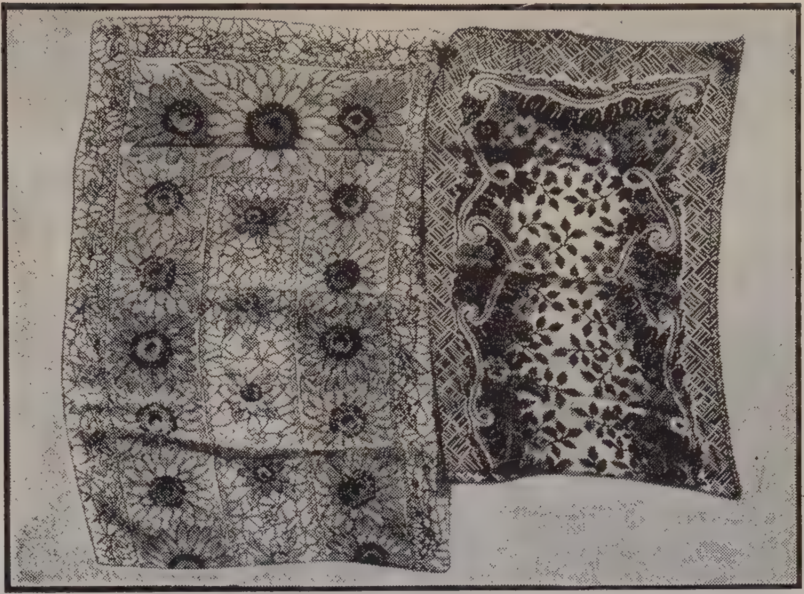
Fugitive colours must be wet for the least possible time, and steeping should be avoided whenever possible. If fabrics have become very soiled, as may happen with curtains and chair covers, steeping for one hour will, by loosening the dirt, cut down the washing time. Steeping is soaking the clothes in cold water; a little detergent added may be helpful but is not essential. All things likely to be needed in the wash should be prepared beforehand; neutral bar soap or soapflakes or synthetic detergent should be used. If starch is required, it also should be ready; also salt and vinegar in case an article begins to lose much colour. The article should be squeezed to force the soapy water, which must be warm only, through the fabric and to carry the dirt with it. Rubbing should be avoided, because though the colour may stand squeezing of the fabric, the harsher rubbing may cause it to mark off. If squeezing alone does not remove the marks, the soiled part should be spread in a single thickness over the hand and rubbed gently with a soft brush; two parts of the fabric should not be rubbed together. The soapy water should be rinsed out in tepid soft water.

If the colour appears dulled, it may be brightened by rinsing the material in a weak solution of acetic acid, that is, in water containing one tablespoon of vinegar to one gallon of water. If the colour has shown a tendency to bleed during washing, the rinsing can be done in a salt solution, one tablespoon of salt to a pint of water, but the last rinse must be in plain water.

If the article being washed is of light-coloured material attached to dark material, to avoid dye running from the dark to the light parts during wringing the article should be laid on a piece of thick cloth, covered with a similar piece, and put through the wringer without being folded.

Other Materials

Jersey cloth should be laundered as wool, silk, or rayon, depending on the fibre from which it is made. Coloured rayon jersey must not be washed in hotter than tepid water and must be treated as are fugitive-coloured materials. The length of the garment should be measured before it is washed. In the washing processes the garment must be lifted from the water as little as possible because it may be stretched by its own weight. Heavy garments should be laid flat and shaped to the correct size while they are being dried.



Washing of articles with fugitive colours. These georgette scarves have been washed in tepid water with neutral soapflakes and the colours have not run. The illustration shows also that ironing an article while it is damp restores it to its original size. The scarves were originally the same size. The one on the left was washed and ironed while damp and the other was dried without being ironed.

Lace may be made from cotton, linen, silk, wool, nylon, rayon, or even metallic thread; it may be white or coloured and it may be hand-made or machine-made. It may also be of great antiquity, as lace more than any other fabric is handed down from one generation to the next.

Old lace requires very careful handling. If it is frail, it may be tacked on to a strip of old muslin or cheesecloth. This can be wound round a tall, thin bottle filled with sand to keep it steady. The bottle may be stood in a jar with a wide mouth (a confectioner's sweet jar is suitable). The muslin should be secured to the bottle by a tacking thread drawn tightly or by rubber bands. Soft water is poured into the larger bottle to cover the muslin and lace and left for a day. If the lace is very soiled, the water may be changed and left to stand another day. After this the jar is filled with suds made from pure flaked soap with a small amount of milk added. (The slight acidity of milk dissolves and decolorises the yellowish matter often seen in old lace.) The smaller bottle is stood in the suds and left overnight, then the lace, still on the bottle, is rinsed by being swilled thoroughly in several lots of water.

If the lace is to be stiffened, gum water, 1 teaspoon to 1 pint of water, is preferable to starch, as it gives a softer, more natural finish. (Gum water is made as follows: 4oz. of gum arabic crystals are washed to free them from dirt. A quart of boiling water is poured on to the crystals in a basin, and the crystals are stirred till the gum has melted. The solution is then strained through muslin. A few drops of formalin are added to this stock solution to prevent the growth of mildew.) The lace, still wrapped round the bottle, is immersed in the gum water and soaked well, then taken out, squeezed, and rolled in a towel to remove as much moisture as possible. The muslin is taken off the bottle and the lace removed.

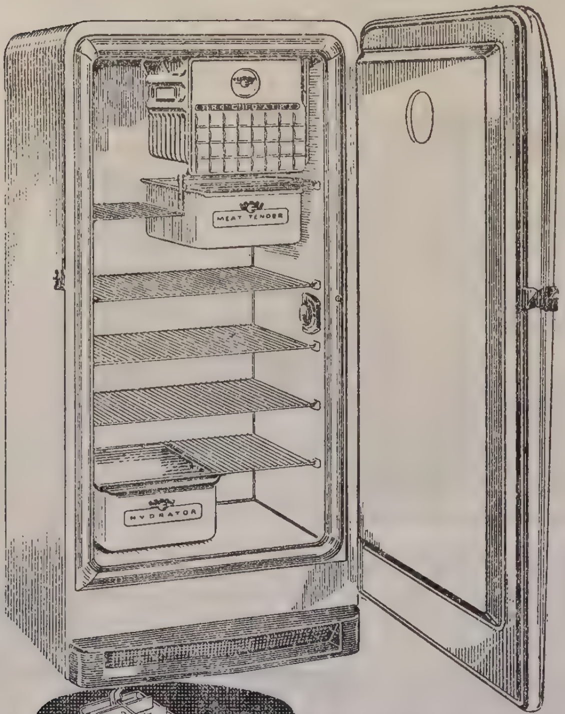
If bleaching is necessary, it can be done after the washing by pinning the lace out on a cloth in strong sunlight and keeping it redamped as it dries.

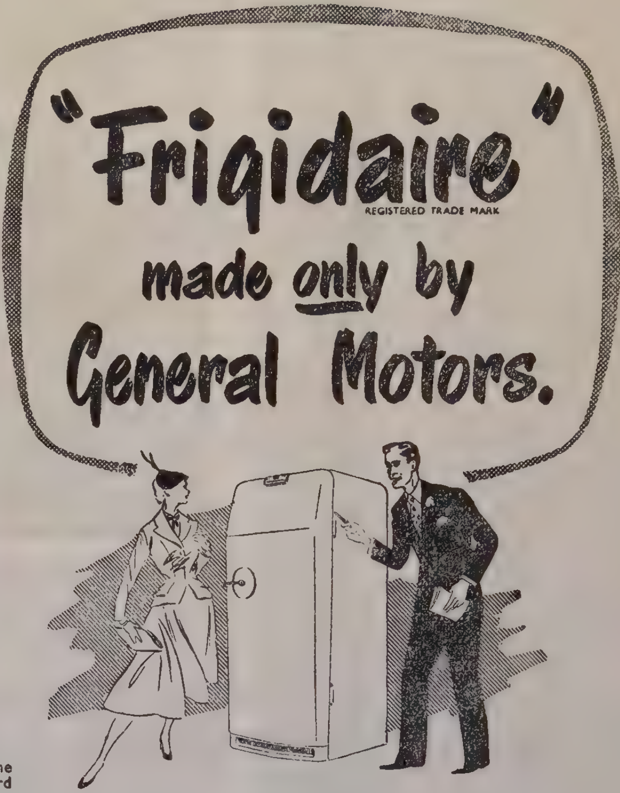
A method of washing suitable for not-so-fragile lace is to place the lace in a wide-necked bottle containing warm soapy water. This is covered over and well shaken, after which the dirty water is poured away and the lace is rinsed by being shaken first in warm and then in cold water.

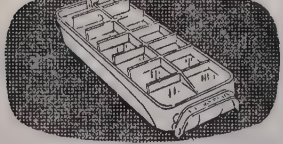
For drying, the lace is pinned out on a piece of board covered with flannel over which is a layer of sheeting, all kept taut with drawing pins at the back. The lace should be placed face downward, smoothed into shape, and pinned round the edges with lace pins as shown in the lower illustration on page 93. If the lace has a straight edge, this should be pinned first, the pins being inserted almost flat along the line of the edge to avoid making points. The other edge is then carefully pinned out to its correct outline and the lace dried in sunlight. Ironing is not usually necessary unless the article is too big to be pinned out, when it may be ironed under a piece of damp muslin.

White cotton or linen lace may, if necessary, be bleached with Javelle water. Immerse the article for a few minutes, rinse and rewash thoroughly, then repeat if necessary. This type of lace may, if desired, be blued slightly in very pale blue water.

Old hand-made silk lace does not wash very satisfactorily and is better dry cleaned. Valuable lace should be stored in blue tissue paper to prevent discoloration and rare heirloom lace should be kept under glass away from air and dust. Powdered magnesia may







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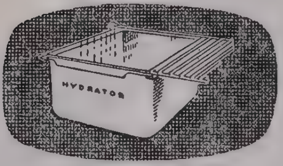

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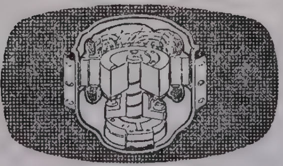

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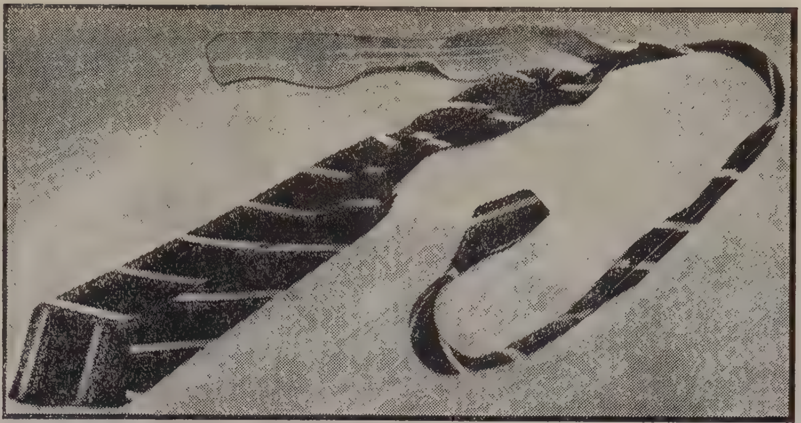
be sprinkled on lace for dry cleaning during storage.



A tie which has been unpicked to above the knot area as a preparation for being washed. The same tie, washed, ironed, and tacked together again, is shown in the illustration at the head of this article.

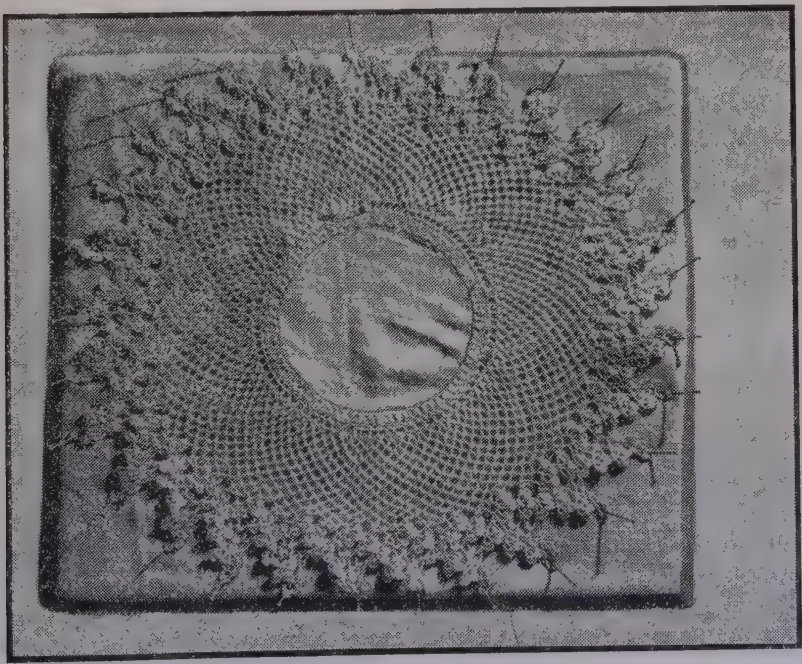
If lace is to be retinted to give it an antique colour, this can be done with tea, coffee, cream dye, or a weak solution of potassium permanganate. Care must be taken with the two last-named, as over-tinting may easily result. A few permanganate of potash crystals are dissolved in water to give a purple colour. A few drops of this water, just sufficient to give a tinge of colour, are put in the rinsing water. Pin the lace out and dry it in the shade.

Lace yokes, sleeves, and collars attached to frocks may be cleaned without removing them from the frock if care is taken to keep the water from running down on to the dress. A heavy towel should be wrapped round the rest of the frock and the lace part cleaned from where it joins the material down to the neck or to the cuffs. After being rinsed the lace should be dried flat on a towel.

Lacquered, cire, and **glazed finishes** on silks, cellulose rayons, and cottons are made by treating the materials with water-soluble waxes or gums and buffering the surfaces in a hot friction calender to produce the desired effect. These finishes, except that of acetate rayon, are usually soluble in water and materials with them are best entrusted to an experienced dry cleaner, as are fabrics with moire effects.

Metallic fabrics, lame brocades, and such like must be regarded solely as high-style fabrics with a very limited period of use. They tarnish readily and crease and wrinkle and nothing much can be done to treat these defects. Brushing with methylated spirit may remove grease and adhering dirt and tarnish. Aluminium thread does not tarnish.

Pile fabrics: Velvets may be brushed and steamed to freshen them and raise the pile. If necessary, they can be dry cleaned and then steamed by allowing steam to pass through them from the wrong side. A needle board (dressmaker's velvet board) is most useful for pressing pile fabrics. The fabric is placed, with the pile surface down, on the board, covered with a damp cloth, and pressed lightly. If a steam iron is used, the damp cloth may be dispensed with. The iron should be held, while being used, about ¾in. above the right side of the velvet. Velvet collars may be cleaned by being brushed with neutral soapsuds, wiped with clean water, and steamed. Velveteen and corduroy may be washed by being moved up and down in warm soapy water, rinsed similarly in several lots of water, and, without being squeezed, hung out dripping wet on a windy, fine day.



Method of pinning out a crochet lace doily for drying. As no lace pins were available, ordinary pins were used for the illustration.

Ribbons should be laid flat on a clean board, brushed with neutral soapsuds from selvedge to selvedge, and rinsed while still being kept flat. The water is pressed out by running the hand held flat down the length of the ribbon and wiping the ribbon with a dry cloth.

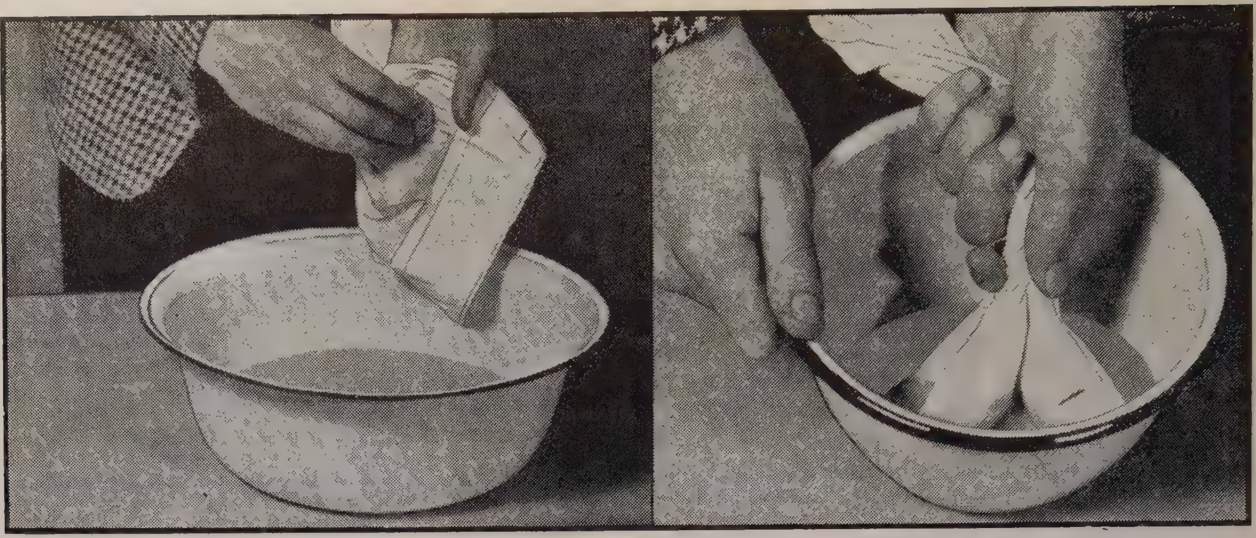
Ties may be better treated by dry cleaning. If washing is preferred, the lining in the wide end must be unstitched and loosened to beyond the knot position. The tie is then washed in the way suitable for the material of which it is made, rolled in a towel to absorb most of the moisture, and pressed on the wrong side. The lining is pulled into shape and ironed and the tie made up as before. A wool tie is treated similarly, except that it is allowed to dry and is then pressed with a damp cloth and warm iron and remade.

Rubberised fabrics such as mackintoshes may be cleaned by placing them flat on a table and brushing them with neutral soap solution or a detergent after the colour has first been tested on an inconspicuous part. The garment is then rinsed with clean water and hung on a coat hanger to dry at ordinary temperature.

Satin: As both silk and rayon with a satin weave are easily damaged by friction, they must not be rubbed. They should be moved up and down in water and squeezed. The surface of satin snags very easily by coming in contact with even the slightest roughness, and this material should be ironed on the wrong side.

Shetland shawls need very careful washing. Suds and sufficient rinsing water should be ready before a shawl is wetted. It should be washed by having the suds squeezed and pressed through it, and rubbing should be avoided. When the shawl is being lifted to be passed through the wringer it should be supported with both hands to avoid stretching, and the tension of the rollers should be slackened. The best method of drying is by pinning the shawl out wrong side up on a cloth-covered board as with lace.

Dress shirts and **stiff collars** are starched in cold-water starch. For a successful result it is necessary for the



Starching of shirt cuffs. The portion of the sleeve immediately above the cuff should be wet (left) and twisted tightly to prevent the starch from spreading into the sleeve when the cuff is immersed (right).

old starch to be thoroughly removed by washing the fabric so that it is left soft when dry; otherwise the old and new starches do not combine properly and the folds of linen will separate and blisters appear. Also the article must be dry, as the material does not absorb the starch as well when wet. Collars are dipped in the starch, two or three at a time, wrung out by hand, and rubbed with a fine muslin cloth to press the starch into, and distribute it evenly through, the fabric. This process is repeated two or three times; then the collars are stretched evenly on a clean towel, rolled up tightly, and left for a time till the towel absorbs some of the moisture. They will then be easier to iron. They must not be allowed to dry before being ironed, since redamping produces a patchy surface and blisters in fabrics of more than one thickness.

In articles such as dress shirts where only parts such as neck bands, fronts, and cuffs are starched the starch can be prevented from spreading by damping the unstarched portion of the garment where it joins the starched part and twisting it tightly before immersing up to the join the part to be starched. The garment is then untwisted and the starched part rubbed with a cloth as for collars.

In ironing raw-starched articles a hot iron is necessary to gelatinise the starch in the linen, and heavy pressure is needed to stick the folds together. The surface starch is rubbed off with a soft, dry cloth and the article is stretched to shape (the stitching sometimes contracts and if not stretched may cause folds to be formed). Too hot an iron will cook the starch grains too quickly on the surface and may cause singeing; too cool an iron will not burst the starch grains and a limp collar will result.

A method of making cold-water starch is given below.

Cold-water Starch
(for dress shirts and stiff collars)

1oz. of rice starch

3 or 4 drops of turpentine

½ level teaspoon of powdered borax

½ pint of cold water

(This quantity is sufficient for about five collars.)

The borax is dissolved in a little boiling water in a ½-pint measure and cold water is added to make up ½ pint. This cold liquid is poured on to the starch and turpentine in a basin. After thorough mixing it is strained through muslin and is ready for use.

Borax is added to give increased stiffness and to prevent the articles from readily becoming limp in a damp atmosphere. Turpentine helps an iron to glide over the surface and decreases the tendency to stick.

Swansdown should be shaken in warm soapy water till it is clean, rinsed in warm water, rolled in a towel to lose moisture, and hung in a warm place and shaken frequently while drying.

Angora wool articles are usually mixtures of wool and hair from the angora rabbit. They are liable to shrinkage and must be treated carefully. They should be washed similarly to Shetland shawls and folded in a towel to pass through the wringer. They should be dried flat on a towel in a warm place and shaken frequently to fluff them up. Sometimes after being rinsed angora wool articles are dipped in a weak cold-water starch, pressed in a towel to take out as much moisture as possible, and dried in a warm place, being shaken occasionally. As they dry the starch falls out, leaving the wool fluffy.

Lightweight woollens: Those made with the aid of alginate fibres should be dry cleaned, except for such things as head scarves, which may be washed with the usual care given to coloured woollens.

Felts are more suitable for dry cleaning, with the exception of table mats, bags, and slippers, which may be sponged with neutral soap lather or detergent and afterward sponged with clean water.

Spots on felt hats which are not generally soiled may be removed by sponging the affected part with carbon tetrachloride (or some proprietary preparation of this). The grease is removed with adhering dirt, which is absorbed by a cloth. The method is as follows: The fabric is spread right side downward on a pad of clean blotting paper or rag. The solvent is applied with a piece of clean absorbent material or sponge, first to the fabric surrounding the mark until this is well saturated, the cleaning liquid being spread unevenly round the stain until there is no definite edge, then to the mark itself, the liquid being worked gradually from the edges of the mark toward the centre. The treated part should be rubbed and blown on lightly and patted with a dry cloth to make it dry quickly. This procedure should be followed when any spots are being removed. If a water ring is left after the part is sponged with water, it may be removed by shaking in the steam from a briskly boiling kettle, brushing the cloth with a stiff brush, and rubbing it between the hands.

Another method of cleaning and freshening felts, furs, feathers, and similar articles is by using such powders as magnesia, french chalk, and fuller's earth, or bran and oatmeal. This method is not as efficient as ordinary dry cleaning, but may be of some use where other methods are not practicable. If sufficient time (24 hours or more) is given and the powder is lightly rubbed in or sprinkled over the whole surface, grease and dirt are drawn from the article into the cleaning agent. The action is helped if the powder or meal is slightly warmed, which softens the grease. The article is then shaken or brushed well. This treatment may be preceded by sponging badly soiled parts with solvent. White powders like magnesia and french chalk are used on white or light-coloured felts, and bran, oatmeal, and such like on dark colours. Great care must be taken to brush out the powder thoroughly; otherwise difficulties will arise with water spotting in rain.

All photographs by Campbell.

Cushions Can Bring Colour and Comfort

By MOLLY MACPHERSON,
Field Officer in Rural Sociology,
Department of Agriculture, Auckland

BRIGHT, well-chosen cushions can do much to enhance the appearance of the home. Dull corners can be brightened with colours and softness and comfort given to a room, a terrace, or outside living. The choice of material and design will depend on the use to which the cushion will be put and on the furnishings with which the cushions will be used. Cushions may be round, oval, square, or oblong, with a small insert for depth if desired, but odd shapes, such as ivy leaves, hearts, and the like, are not always practical or in good taste.

IF the cushions are to be used outdoors, hessian, coloured woven braid strips, heavy linens, or cottons are suitable and need to be in strong colours and in patterns rather than pastel shades. The cover material needs to be sunfast and hard wearing.

When cushions are to be used indoors the decoration scheme can be complemented or contrasted by the colours in the cushion.

There are many ways to make cushions attractive; the material of the cushion cover may be plain, floral, striped, embroidered, appliqued, piped with a contrasting colour, patchwork, woven with wide strips of braid (Fig. 1), or any other choice which may suggest itself, provided the cushions become part of the decoration scheme and blend with other cushions through colour, shape, and texture. For example, gingham and velvet will not normally complement each other, nor will embroidered linen and striped woollen material. Painted cushions and taffeta cushions are not always a practical choice for long life, and cushions should always look inviting and be ready for use.

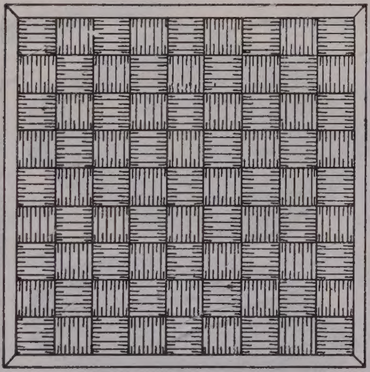


Fig. 1—Cushion cover woven from wide strips of braid.

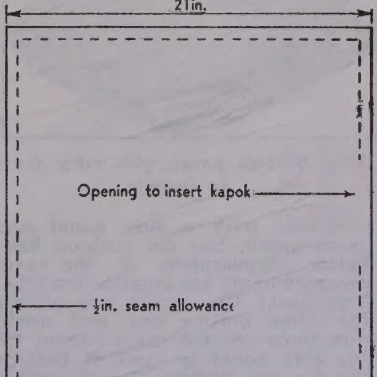


Fig. 2—Case of a simple square cushion.

Choice of Materials

Kapok makes the most satisfactory filling for cushions; 2lb. of kapok is required for each 20in. square cushion to make it plump and well filled. New kapok is best, but it may be taken from a used mattress if it is in fairly good condition. A good-quality unbleached calico is needed to hold the kapok filling and a suitable material for the cushion cover is needed. The cushion cover opening can be hand sewn after the cushion has been inserted or the opening may have domes sewn on for closing. Domed tape may be obtained and used to close the cushion cover opening. With a domed fastening removal and replacement of covers for washing are much easier.

Cushion Construction

1. **A simple square cushion** may be made by cutting two 21in. squares of unbleached calico for the case. Sew together with a ½in. seam allowance on all four sides except for 7in. in the middle of one side (Fig. 2). Turn the stitched calico inside out, pulling out all the corners, and fill the cushion case with kapok, which may need teasing out. Slip stitch the opening to enclose the kapok firmly. Make the cushion cover the same size and shape it in the same way as the cushion case, leaving a larger opening on one side so that the filled

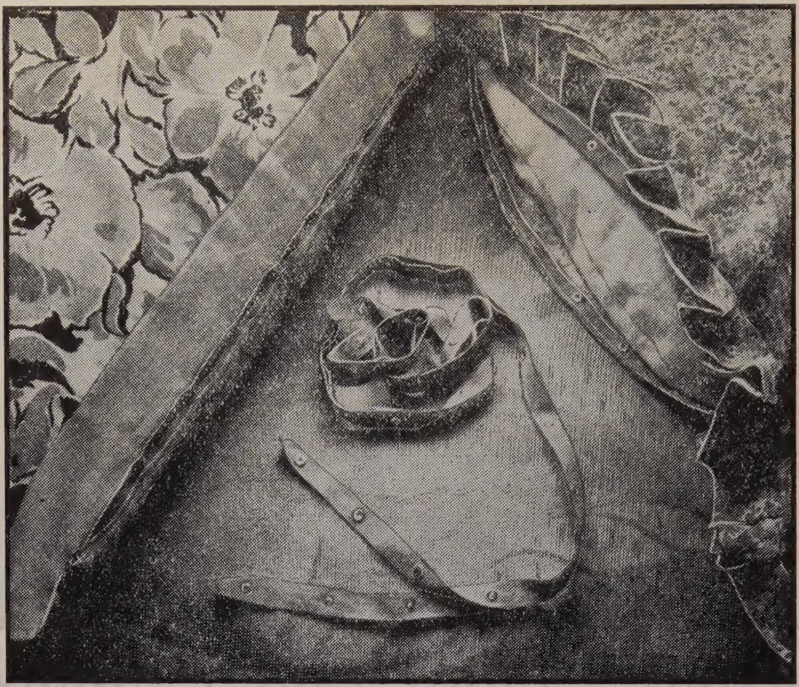


Fig. 3—Domed tape may be used for closing the opening of the cushion. This saves tedious resewing after laundering.

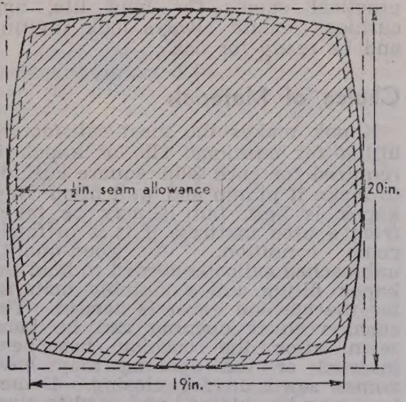


Fig. 4—Method of cutting a square cushion to obtain better filled corners.

cushion may be inserted. The side which is to be left open may have extra material allowed for flaps, turn-ins, or extra pieces sewn on for flap turn-in. Attach the domes or domed tape on the seam line to close the opening and press the cushion cover.

2. **Square cushions** tend to have corners that look like ears. To make a square cushion with a better filled corner, cut material for cushion case and cushion cover as in Fig. 4, and make the cushion case and cover as described for the simple square cushion.
3. **Round cushions and oval cushions** can be made to any size required or as the material will allow.

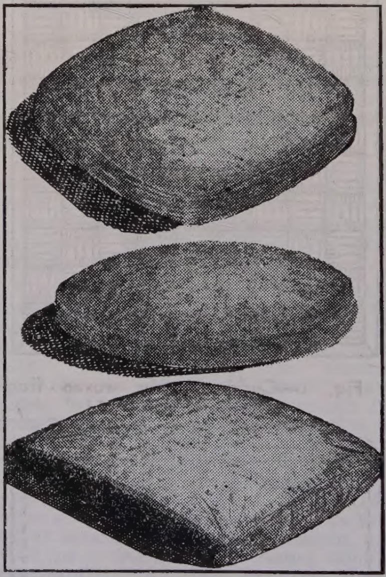


Fig. 5—Side panels give extra depth to cushions.

4. **Cushions with a side panel** have extra depth, but the cushion has a better appearance if the cross measurements are smaller than 20in. The usual ½in. seams are allowed for when cutting out, and sewing directions are the same except that the side panel is inserted between the top and bottom of both cushion case and cushion cover as in Fig. 5.

Photographs by Sparrow.

Large Crochet Shawl

THE materials needed to make the large warm shawl illustrated above are: 9oz. of blue 2-ply wool, 1oz. of white 2-ply wool, and a No. 7 crochet hook.

Measurements: About 45in. square.

Tension: 10 stitches or 5 crosses measure 2in.

Abbreviations: Ch., chain; d.c., double crochet; tr., treble; s.c., single crochet; l. tr., long treble; patt., pattern; st., stitch(es); rep., repeat.

The Centre

Make a ch. about 40in. long and work 1 d.c. into each ch. Continue thus:—

Pattern row: Turn with 1 ch., * tr. into second st. from hook taking up 2 loops, d.c. into first st. from hook, putting hook in downwards and taking up 1 loop only, thus crossing the stitches. Rep. from * to end. Rep. this row until the work forms a square.

The Border

Join in the white wool and work two rows in patt. thus:—

First row: Work in patt., making 3 ch. at each corner.

Second row: Work in patt., working 2 ch., 2 patt. st. (or 1 cross) 2 ch. at each corner. Join blue wool and work thus:—

First row: * 2 patt. st., 4 ch., miss 2 st. Rep. from * all round, working (4 ch., 3 tr. into corner patt., 4 ch.) at each corner.

Second row: * 3 ch., 2 patt. st. into 2 centre ch. st. of previous row. Rep. from * working (1 ch., 5 tr. into centre tr., 1 ch.) at each corner.

Third row: * 1 ch., 3 tr. into centre ch. of previous row. Rep. from * working (1 ch., 7 tr. into centre tr., 1 ch.) at each corner.

Fourth row: * 1 s.c., 1 d.c., 2 tr., 2 l. tr. into the 1 ch. between tr. groups of previous row. Rep. from * working (1 s.c., 1 d.c., 2 tr., 1 l. tr., 2 tr., 1 d.c., 1 s.c.) into centre tr. at each corner.

Fifth row: Using white wool, work picot edge thus: Work 1 d.c. into each st. of previous row, working a picot (3 ch., d.c. into third ch. from hook) at the centre of each scallop.

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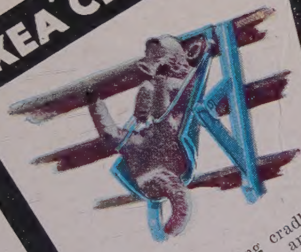

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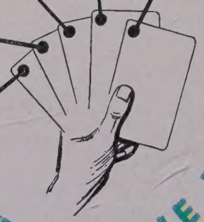

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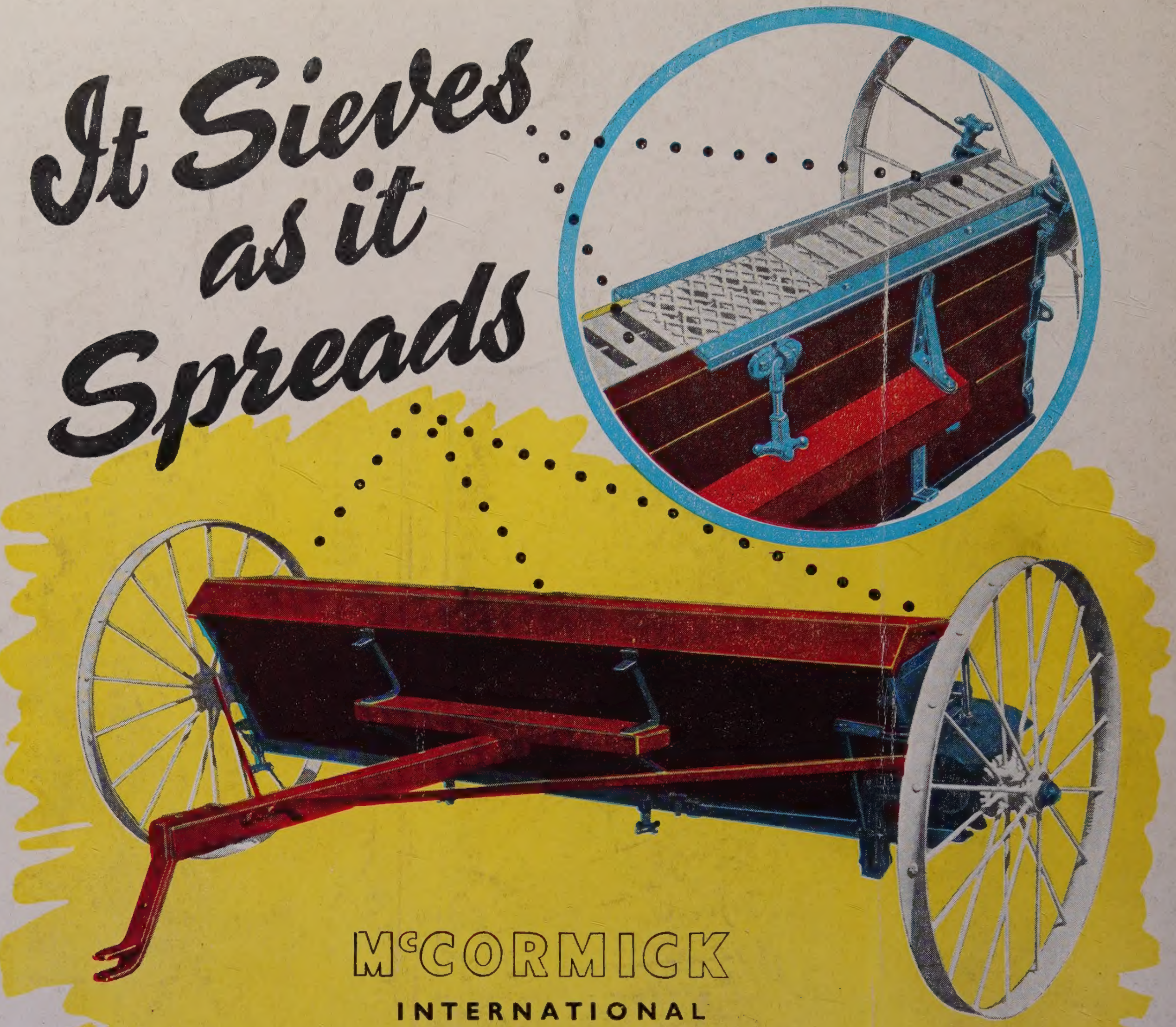

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